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ANTHRAX IN INDIA.

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NUMEROUS articles have lately appeared on Anthrax as it affects animals in India, but I do not think the subject has been advanced any further than was already known regarding it many years ago. Recently, Mr. Smith has written somewhat at length on the subject, but he has considered only two forms of that malady, namely abdominal and respiratory, which he treats of very fully. Without going into details, I may be permitted, in the short space at my disposal, to record the salient features of the disease, and the different clinical aspects it presents, from my own experience of it.

Although ever the same disease, dependant on a common cause, its modes of manifestation differ considerably in different outbreaks, and in different cases in the same outbreak. My experience leads me to recognise the following divisions, which may be made for convenience of description and to facilitate diagnosis, viz., the respiratory, gastro-intestinal, renal, hepatic, nervous, subcutaneous or "carbuncular," cutaneous, and intermittent forms. In some works on veterinary pathology the above-mentioned are divided into internal and external forms of Anthrax: this division has many supporters, inasmuch as the fatality varies so greatly in the internal and external forms of the disease, requiring separate description. There is no doubt, too, that frequently one type of the disease runs into the other, and sometimes one or more types co-exist; but according to my experience, the external form seldom leads to the internal, and, when not a complication, is generally less fatal than it.

1. The Respiratory form of Anthrax shows itself as a specific pneumonia, with rapid death. This form of the disease has been very

clearly sketched by Toussaint, and need not call for description here.

2. The Gastro-intestinal form of Anthrax presents all the symptoms of acute Gastro-enteritis, and post-mortem examination shows the effusions peculiar to Anthrax which do not appear in simple Gastro-enteritis. Occasionally, the lesions of Anthrax located in the alimentary canal are so marked, that symptoms of acute Dysentery, œdema, degeneration, and sloughing of the mucous membrane in shreds, and even prolapsus recti, result. Death takes place usually in from four to seven hours, although it may be earlier in some, and later in other cases.

3. The Renal form of Anthrax is ushered in with symptoms of acute nephritis and rapid death, owing to urinary poisoning, which complicates these cases. Post-mortem examination shows changes peculiar to Anthrax, located principally about the kidneys and in the renal structure. The presence of the *bacillus anthracis* may be detected on examining sections of the latter organ under the microscope, in the afferent and efferent vessels, in the glomeruli, and even in the parenchyma of the kidney outside the vessel walls, and in the uriniferous tubules. Consequently, the urine is a source of great danger in outbreaks of Anthrax, and the bedding of affected animals should always be burnt, and the flooring of stables scraped.

4. The Hepatic form, where, according to my experience, the symptoms of Hepatitis follow in the course of the general symptoms peculiar to Anthrax. It seldom appears as a primary symptom. Consequently, I look upon it as more a result than a distinct variety of Anthrax. Some observers, however, maintain that the symptoms of Hepatitis are prominent from the first, and, therefore, believe the hepatic disease to be a distinct form of Anthrax.

5. The Nervous, or neurotic forms.—I recognise three distinct varieties of this form of Anthrax in India, which I may divide into (*a*) the apoplectic, (*b*) the furious, and (*c*) the paralytic. An animal, without having shown any signs of previous illness, will suddenly fall to the ground, as if struck by lightning. In other cases the animal trembles, showing laboured breathing, a weak, small character of the pulse, and marked palpitation ; is soon agitated, rushing about in the stall in a wild manner, biting the manger or any other prominent objects in his way, or even his own flesh, with his teeth, and becomes utterly unmanageable (furious Anthrax). Convulsions usually precede death in these cases. Sometimes paralysis sets in early in this disease, death taking place usually in a few hours after the animal has fallen to the ground.

The apoplectic form is the most common variety of Anthrax met with among camels in India, while it is occasionally seen also in horses and in oxen. The furious and paralytic forms are seen

chiefly in the horse. It is well known to the Germans; for I find Röll, in his *Lehrbuch der Pathologie und Therapie* (1885), says, that the common people in some parts of Germany speak of it as the Devil's shot, Blood-plague, &c., and he regards it as a very frequent variety of Anthrax in Germany.

Horses usually drop to the ground suddenly, and expire without a struggle in many cases. Camels, in most cases, break loose and "run wild" for fifty paces or more, and suddenly drop to the ground as if shot through the heart, and usually die without a struggle. Dr. Röll believes death follows through paralysis of the lungs and heart's action. My observations of a great many cases lead me to confirm this view, whilst in other cases in which death was more rapid, or I may say instantaneous, death, in my opinion, was caused by shock. Post-mortem examination shows no congestion of the brain, and hence some object to the use of the term apoplectic. If so, we may speak of it as that form of Anthrax in which death usually takes place by nervous shock, to avoid misapprehension.

Diagnosis: the furious and paralytic forms of Anthrax are liable to be mistaken for Rabies chiefly. When paralysis is the main symptom, the diseases with which it may be mistaken are, Rabies, Kamri, Beri-beri (Wallace Taylor), Relapsing fever (Steel), and other diseases of the blood attended with effusion on, or changes in the spine. Diagnosis will be rendered easy by (*a*) microscopic examination of the blood and other tissues showing presence of the *bacillus anthracis*; by (*b*) the history of the case, and the appearance of the disease in other forms in other animals; and (*c*) by the course and symptoms of the disease.

6. The Carbuncular form of Anthrax occurs as a subcutaneous infiltration and enlargement, which, in the horse in India, is seen chiefly under the jaws and region of the larynx. Dieckerhoff (*Lehrbuch der Speciellene Pathologie und Therapie der Thierarzte*, 1885) agrees with us in this experience. Death usually results from suffocation, owing to the swelling extending to the face and involving the laryngeal and nasal regions.

In cattle and other animals the swellings appear in different parts of the body, and, in the camel, especially along inside of both thighs.

I agree with Mr. Smith that this form of Anthrax is not accompanied by much, if any, Emphysema about the swellings. The swellings are diffuse or circumscribed, often fluctuating but usually tense, and there is no crackling sound communicated to the fingers on pressure.

Bollinger and Feser, in Bavaria, and Arloing, Cornevin, and Thomas, in France, have noted the presence of the Bacillus

Anthracis in the blood and other tissues of animals affected with Emphysema Infectuosum, and have concluded that the presence of the organism confirmed the identity of Emphysema Infectuosum and Anthrax beyond doubt. But it is also known that "Anthrax very often makes its appearance at the same time as Emphysema Infectuosum" (Röll), and we have no evidence to show that the two diseases have not frequently co-existed in the same animals. If a few more members of the profession would publish the results of their experience of Emphysema Infectuosum, investigators might be constrained to recast the system of inquiry on which former investigations have proceeded.

7. The Cutaneous form of Anthrax, in which the structures of the skin are primarily invaded, leading to eruptions, boils, and abscesses. This is the least dangerous form of Anthrax, because results due to changes in the skin are not at all comparable to those following changes in more important organs of the body, as the lungs, intestines, kidneys, etc. The functions of the skin can be taken up more easily by the lungs and kidneys than those of the latter can by the skin, when labouring under disease or derangement. And this fact has often been overlooked, it has seemed to me, in considering the relation of external to internal Anthrax.

8. Intermittent Anthrax is that form of the disease where the animal revives after an attack, and some days after a relapse occurs, and the case is often entered as a fresh one; this form of the disease was first noticed, in cattle by Bollinger; and in the last outbreak of Anthrax in Government transport camels in Cawnpore, I have recorded several such cases.

Besides the above-named varieties of Anthrax, many cases are complicated with hæmorrhage from natural openings, as the nostrils, urethra, anus, etc. In the case of the nostrils, the serum and blood which escape get mixed up with the air in respiration, and assume a peculiar frothy aspect, which has been especially remarked in the Cape sickness* of horses, and is not an uncommon symptom of Anthrax as seen in India.

I have also to mention, in this connection, a form of *malignant sore throat* in cattle, which I was deputed to investigate a few months ago at Allahabad. I was ordered there to inquire into an outbreak of disease reported as Anthrax. On my arrival at Allahabad I was also informed it was an outbreak of Anthrax I had come to investigate. I made inquiries about the number of casualties, and was told the casualties amounted to *nil*, notwithstanding that numerous cattle were affected. This drew my attention to the subject somewhat more closely, and my chief object of inquiry was to determine how much of truth there was in the

* Wiltshire, VETERINARY JOURNAL, 1878.

general report as to the nature of the outbreak being an anthracoid one. My investigations there led me to these conclusions, briefly:—

(*a*). That Malignant sore throat in cattle is caused by the Bacillus œdematis of Koch, and this bacillus is readily transmissible from oxen to oxen by experimentation.

(*b*) That the fatality in this disease is very low, indeed *nil* in cases in which early fomentation and blisters to the throat have been resorted to.

(*c*) That the cause of death is purely accidental, and due entirely to mechanical obstruction of the throat and suffocation.

Contagion of Anthrax.—The modes of conveyance of the germs have no special relation to the question of Anthrax only; it is not settled by what channels, in every instance, the germs of specific diseases in general travel. Thus Cholera, Typhoid Fever, etc., etc., have each its suspected sources, but no one source can be made to apply in each particular outbreak. It is possible the germs travel through various channels, some known and others unknown. Among some of the known channels may be mentioned the air (Tyndall), water, grass roots obtained from burial-grounds (Darwin) of affected animals, where earthworms become the intermediate bearers; and direct contagion from animal to animal. From what I saw of the last outbreak of Anthrax in horses of the 17th Lancers at Lucknow, about two and a half years ago, I have little faith in air as a medium of contagion, as the two batteries of Artillery close to the Lancer and Native Cavalry regiments escaped contagion, although not many yards distant from the Cavalry lines. The same fact was often observed in the late stud outbreaks, in which often only one stable was affected, and the others remained free throughout. However, a volatile form of contagion in Anthrax is recognised by many observers. Zundel ("Recueil de Méd. Vétérinaire," May and June, 1871) recognises a fixed and a volatile contagion in Anthrax; and Fleming also mentions it. Many so-called spontaneous outbreaks of the disease may thus be explained on the possibility of air being a medium of contagion, the germs floating in the air, more during certain conditions than during others, alight on susceptible animals.

Instances of Anthrax communication by affected animals, I have only recently reported in the case of this disease introduced among camels belonging to the army transport in Cawnpore, on the arrival of affected animals from Allahabad; and also in the case of slaughter-cattle at Allahabad about three years ago, through intercommunication of suspected cattle employed in carrying fodder for healthy ones. Such instances could be multiplied *ad infinitum*.

Among indirect means of contagion may be mentioned the excreta

of animals affected with this disease, and bedding, clothing, utensils, etc., used by them; also flies, vultures, jackals, etc., all of which may be active agents in promoting the spread of Anthrax. And, finally, the bodies of affected animals in particular, which should not be buried, but cremated in every instance. If this were done in the case of village cattle as well, the grass-cut ponies would no longer be blamed for introducing Anthrax into cantonments.

Treatment.—Carbolic acid was first recommended by Dr. Fleming, and found very useful in many outbreaks, and in the *Vratch* several leading articles have recently appeared, lauding the therapeutic value of carbolic acid in the treatment of Anthrax in man. Among the other agents which have been found useful, may be mentioned iodine and iron, especially the perchloride of iron recently mentioned by Steiger. Although these remedies have their uses, it must not be concluded that they are necessarily calculated to produce a certain cure in every case of Anthrax; if such a success could be achieved, Anthrax would no longer be the dreaded malady it has proved to be hitherto.

The mortality of Anthrax is given by Bollinger at seventy per cent. My experience is, that treatment by carbolic acid reduces it to fifty per cent.

CIRRHOSIS OF THE LIVER, WITH ACHOLIA, COMA, AND DEATH.

BY J. MOORE, M.R.C.V.S., MANCHESTER.

On Nov. 24th, 9 a.m., Mr. Hopkin, F.R.C.V.S., and myself were requested to see a four-year-old brown pony, 13½ hands, which we found presenting the symptoms of Cerebro-Meningitis; pressing the head against a firm object, amaurosis, dilated pupils, partial paralysis, small, accelerated pulse, etc. The manger had been recently and severely bitten, as is often seen in Rabies, and the inferior temporary corner incisor, with a spicula of the inferior maxilla, broken out, but on inquiry no evidence as to the animal having been bitten by a rabid dog could be obtained. The usual remedies were resorted to, but the animal became more comatose and died about 6 p.m.

Post-mortem Examination.—The liver was found enormously enlarged, being 30lbs. in weight. It was uniformly enlarged, very light in colour, almost bloodless, firm to the touch, and cut like a piece of fibrous tissue or muscle; in fact, quite in a state of cirrhosis. The other abdominal organs seemed healthy. The stomach was engorged, the contents dry and moulded to the shape of the organ. The thoracic organs were healthy. A careful examination

of the brain was made, but there was no inordinate congestion. There was, however, an extravasated spot of the size of a three-penny-piece on the dura mater, near the pituitary body. The blood was of a dark colour.

Etiology.—It was evident that the brain symptoms were secondary to, and a result of, the changes in the liver. The brain and a portion of the liver were forwarded to Professor Williams, and, in reply, he said:—"The specimen is one of rapidly-developed cirrhosis, and should say that the coma, etc., were more due to blood-poisoning from non-elimination of bile, etc., than to the condition of the brain." Bearing in mind the state of the liver, and the fact of the bile constituents being formed in the blood, and only eliminated by the liver, this view will seem admissible to all. The skinner remarked that it was a "lunatic's liver," and there was truth in the remark, as this condition of liver is found in dipsomaniacs.

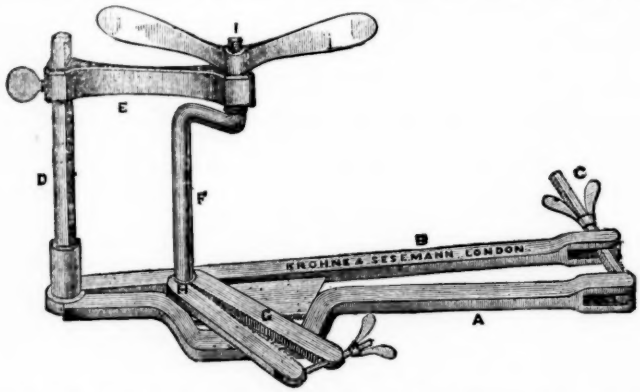
The cause of the cirrhosis is difficult to solve. There was no apparent disease of the supplying and receiving blood-vessels. The pony was four years old, and had lived two years of its life on the Welsh mountains. It had been in the possession of the owner nine months, two months of which it had been out at grass, coming up only a fortnight before death. The food, consisting of crushed oats, bran, and chop, with a little long hay, was of the ordinary kind, and to all appearances good. The stable was a fairly good one, and to the owner's knowledge the pony had never been ailing until two or three days prior to death, when it appeared dull, listless, and refused its food.

TORSION FORCEPS AND CASTRATING CLAMP COMBINED.

BY J. A. NUNN, F.R.C.V.S., ARMY VETERINARY DEPARTMENT.

THE instrument which I beg to bring to the notice of the profession consists of an ordinary torsion-clamp, A B, the arms of which fasten together by the screw C. Into the joint of the two arms A B, a rod D is morticed. This rod D has a joint or hinge just above where it is fastened into the two arms A B, that allows it to fall flat with A B for convenience in packing up. It is kept in an upright position by a loose collar which slides up and down as far as the stud opposite, D, that is for the purpose of preventing its falling off and getting lost. In the drawing the collar hides the hinge in the rod D. An arm E is fastened on to D by means of the thumb-screw, shown in the drawing, that allows of its being

removed or raised and depressed at pleasure. Through the other end of the arm E a crank F is placed, one end of which carries a handle I that screws on to it; the other end carries the clamp G



that also screws on or off as desired at H, and is closed by a screw in the same manner as C. When used, the scrotum is opened in the usual way, the cord being fastened pretty high up in the clamp A B, and a second time in the clamp G, which, revolving on the crank F by the handle I, twists the cord and gives the requisite torsion. The advantages claimed for this instrument is that, the clamp and forceps being fixed, no jerking or tearing can take place or is liable to happen, as with the ordinary torsion forceps, when the animal struggles; also in portability, the rod D falling flat on the clamp A B, and the arm E, handle I, crank F, and small clamp G, all taking into separate pieces, allows the instrument to be packed into a leather case that will go into the pocket. The instrument is made by Messrs. Krohne & Sesemann, Duke Street, Manchester-square; price £2 5s.

UNUSUAL EXPULSION OF FŒTAL MEMBRANES.

BY J. DONALD, M.R.C.V.S., WIGTON.

THE following are briefly the particulars of a case of abnormal expulsion of the fœtal membranes which occurred in my practice on the 6th December last.

A cow, that had just completed the seventh month of gestation, showed signs of parturition about 7 p.m. The labour-pains gradually increased till 8 p.m., when they became regular and severe,

resulting in the expulsion of the placental membranes, but no fœtus. A cessation of the pains followed, during which time the cow chewed her cud, and appeared comfortable. Two hours elapsed, and the pains again returned, and continued for about half-an-hour, when the calf was expelled.

Not having previously met with this abnormality, I made an inspection of the fœtal envelopes, which I found properly developed and normal, except that degenerative changes had taken place in the fœtal cotyledons. The calf was dead, but in other respects normal. Abortion has existed on this farm for the last three months.

"EMESIS" IN THE HORSE.

BY R. H. RINGE, M.R.C.V.S., A.V.D., MUTTRA, INDIA.

TROOP horse F 58 (fourteen years old) reported at 6 a.m., 13th August, as being "dull and blowing hard." Admitted into hospital evincing the following symptoms:—Profuse discharge of ropy saliva from mouth, buccal mucous membrane pale and covered with a viscid secretion, pulse accelerated (56 per minute), but normal in character; temperature normal; respirations quickened and laboured; head depending, and the animal having a dull and distressed appearance. No abdominal pain evinced, although there was great uneasiness, as shown by the animal continually moving about, accompanied by grinding of the teeth.

Taking into consideration the continual discharge of saliva, grinding of teeth, and the general uneasiness manifested, I suspected the presence of some irritating material in the alimentary canal; but, before giving a decision, I examined the stall which he had previously occupied; nothing could be seen to arouse suspicion, with the exception of a few grains of whole gram lying about on the floor, close to the side of the mud manger.

Knowing that the animal had been discharged only a short time previously from hospital (where he had been under treatment for Bursattie), and was in a somewhat low condition, I made inquiries whether he had in any way received *extra* food, but none was reported to have been issued. Returning to the hospital, I noticed that during my absence several grains of gram had been discharged with the saliva, and while I was in the box he commenced to vomit freely, through *mouth* and nostrils, and in the course of two hours had ejected from three to four quarts of thick, greyish fluid, with about two pounds of whole, uncrushed, but swollen gram.

The acts of regurgitation were very violent, and could be distinctly heard several yards distant.

The nature of the disorder was now apparent, and there was no

doubt that the vomition was caused by distention of the stomach with food liable to (and undergoing) fermentation, and that this food had been given surreptitiously by the syce for the purpose of improving the animal's condition. This view was favoured by the fact that all gram issued by regimental authorities is thoroughly crushed, and also that no feed had been issued that morning.

Treatment.—With the object to soothe and prevent irritation to the gastric mucous membrane, complete abstention from all food was ordered, and small quantities of demulcent fluids given with five-minim doses of Tinct. Acont. (Fleming's), and, to encourage the action of the bowels, employment of enemata of tepid water and oil ordered every hour.

The vomition continued for six hours, the vomit being for the first two hours expelled in large quantities with great force, containing nearly half its bulk of gram, but after this period it became thinner in consistence, smaller in quantity, and the periods between each ejection longer, until they gradually ceased, and the animal rapidly recovered.

There was, of course, a certain amount of exhaustion consequent on the continual straining; but this was combatted by milk diet, and the horse returned to his duty on the second day.

This case is, I think, of interest owing to its rare occurrence in the horse unaccompanied by severe gastric disturbances or textural changes ["This condition (Emesis), common enough in all other animals which engage our attention, is of rather rare occurrence in the horse."—*Vide* Robertson's "Equine Medicine"]; and is of practical value as proving that vomition may and does occur during simple repletion and distention of the stomach, without rupture of its walls.

I can only find two similar cases recorded in the VETERINARY JOURNAL—one by Mr. T. Bonhill, V.S., November, 1885, and one by Inspecting Veterinary Surgeon Meyrick, C.B., December, 1885.

INFLUENCE OF FEAR ON THE MAMMARY SECRETION.

BY G. H. R. WILKINS, F.R.C.V.S., LAMBOURNE.

A SOMEWHAT extraordinary case of early lactation occurred recently in my practice. An unbroken thorough-bred yearling, when at exercise, broke away from her lad, and charged some strong iron fencing. Besides other injuries, she received a very extensive lacerated wound on the chest; there was a flap twelve inches by nine. I found it necessary to insert fifteen sutures. During the operation the filly was very frightened, struggled violently, and

milk was secreted in large quantities from the mammæ. The operation, on account of the restlessness of the patient, took a long time to perform (about one hour), during which period the flow of the milk did not cease. On two subsequent occasions, when dressing the wounds, lactation again took place; but as the animal became accustomed to having her wounds attended and the pain became less, this phenomenon ceased. There was nothing about the udder of the filly different from that of another animal of the same age; in fact, there was nothing to be felt or seen but the teats. While I was attending this case, one of the stable lads informed me that an unimpregnated two-year-old mare, in his charge at the beginning of last year, used to frequently secrete milk, upon being dressed under the belly. Dr. Carpenter, states in his "Manual of Physiology," "The secretion is usually checked altogether by terror" (p. 614). It produced a directly opposite result in the case of my patient.

EXPERIMENTS IN "STAMPING OUT" PLEURO-PNEUMONIA.

BY J. HUNTER, M.R.C.V.S., SKENE, ABERDEENSHIRE, N.B.

In these times of interesting discussion on the suppression of Pleuro-pneumonia, a brief communication (with a few remarks) on the results of stamping out a few outbreaks, I had the fortune, or rather misfortune, to encounter in this district during the last summer, may not be out of place in the Veterinary Journal.

Outbreak No. 1. A field of thirteen home-bred two-year-olds—origin of disease unknown. One animal affected and slaughtered, field along with five other adjoining fields declared an infected place. A month after found another animal attacked in the really infected field. Owner consented to stamp out without any compensation. A few days after, autopsy revealed nine animals having been affected, and four healthy. Subsequently, all the animals in the two adjoining fields, in immediate contact with the diseased animals, were also slaughtered, minus compensation, *post-mortem* showing no trace of disease in any of them. Fifty-six days, and the place declared free.

No. 2. Whole farm, forty-four cattle, nine of whom were found affected and were slaughtered at the very outset of the malady, some of them in the last stages. A short time after one other animal had to be slaughtered; three months' quarantine of the remainder, and the place declared free.

No. 3. A grass field of eleven home-bred yearlings; origin of

disease unknown. One animal found diseased, and, with consent of the owner, was slaughtered. The field, along with other five adjoining fields, declared an infected place. Another few days and other two animals had to be reported as suffering from Pleuro-pneumonia, and by order of the local authority were slaughtered. Three more being almost immediately reported as attacked, the field was ordered to be cleared out. Ten out of the eleven showed more or less traces of having been affected; three months, and the place declared free.

No. 4. Whole farm, thirty-two cattle; origin of disease, an Irish stirk. This animal had been on the premises in contact with the rest for three months; the latter two months. The owner deposed it had had a bad cough, and having been examined by the inspector of a neighbouring district was declared to be suffering from Pleuro-pneumonia, and this was certified after *post-mortem* examination by the county inspector, two other animals were stated in the police-man's notice to me of the outbreak as being suspicious, which I reported in my weekly returns. These two animals did seem to be attacked, but so slightly that there was no certainty of exact diagnosis before they had recovered. Three months, and the place declared free.

Remarks.—I fancy it will be difficult to find in all the above outbreaks, in what way it would have been possible to save a single farthing to the ratepayers, with impunity, by the much-vaunted operation of inoculation, even supposing it were everything that it is given out to be by its advocates. But it seems clear that, under the peculiar circumstances in connection with the outbreaks in this district, that had inoculation been had recourse to, it would have received the credit of saving two or three hundred valuable cattle. I am afraid the candles of science will have to burn far more brilliantly before many of us can see our way clearly, to voluntarily fall in line with this caudal inoculation hobby; it seems so difficult to understand the *rationale* of its action. The tail, or any other tissue of the body outside the chest, which seems to be the peculiar natural habitat of the virus, does not seem to have any attraction naturally for this virus, the same as in most other plagues. Of course, blood diseases are more easily understood, and small-pox, for instance, is a cutaneous disease, and vaccination is practised, of course cutaneously, and shows the identical characteristics of itself. It is said that the morbid appearances and products of a Pleuro-pneumonia inoculated tail are a facsimile of a Pleuro-pneumonia infected chest. Now it seems to me that is an impossibility. They are quite different sort of tissues, and there seems no power in the tail to throw out the products or show at all the same beautiful appearance. I fancy he would be a genius, quite a prodigy of

science, who would be able to distinguish Pleuro-pneumonia in a tail, not knowing beforehand whether the inflammatory lesion was caused by the action of Pleuro-pneumonia lymph, or certain other irritant morbid products. It is said that the cause of Pleuro-pneumonia, viz., micrococci, are found the same in the tail inoculated with Pleuro-pneumonia as in a Pleuro-pneumonia affected chest; but I am not aware that the characteristics distinguishing Pleuro-pneumonia micrococci have ever been properly demonstrated, besides, to know them as the same; and I reckon researchers would have little difficulty in finding micrococci in almost any morbid condition; and, lastly, the want of a tail, one of the results of inoculation, instead of being a distinguishing mark or brand of danger, would likely be a brand of confusion. It would not be very easy for common people, at least, to know whether such a tailless animal came out of Lung Complaint, Liver Complaint, or Red Water, etc., etc.; or, is every poor man, who happens to have a tailless cow for sale, to be branded as trafficking with Pleuro-pneumonia? and what is to hinder the Pleuro-pneumonia cow to be palmed off as merely having had a touch of Red Water, etc.?

Editorial.

THE ADVANTAGES AND DISADVANTAGES OF PROTECTIVE INOCULATION IN CONTAGIOUS PLEURO-PNEUMONIA.

A SERIOUS discussion has been going on for some time, not only in this country, but in the United States, Canada, and even on the continent of Europe, as to whether inoculation, as usually practised, protects cattle from the invasion of Contagious Pleuro-pneumonia, and also as to whether the operation itself may not be a source of danger in spreading the disease. The efficacy of inoculation as a protective measure, when properly carried out, cannot be doubted after surveying the evidence that has been accumulating in many parts of the world for more than thirty years. This evidence consists of the careful experiments and observations of Commissions appointed by Continental Governments, and composed of the most competent medical men and veterinarians to be found in the respective countries; and also that of members of the veterinary profession, whose individual testimony is the result of many years' constant inoculation in regions harassed by this bovine scourge. Perhaps the most convincing, as it can be relied upon as the most trustworthy, evidence of individual inoculators is that of Mr. Rutherford, of Edinburgh, whose scientific skill and cautious procedure renders this prophylactic measure almost absolutely successful in every instance in which he employs it. In Holland it was resorted to in extinguishing the malady, in order to diminish the terribly heavy loss which wholesale slaughter of diseased and healthy (though suspected) cattle would have entailed. In conjunction with prompt occision of the already sick beasts, inoculation of those yet uninfected must lead to extinction of the pest without the grave sacrifices which general "stamping out" would demand, and especially when wide tracts of country are infected with it. As in Holland, so in France. The ninth article of the Sanitary Code of that country states that, "l'inoculation des animaux d'espèce bovine sera prescrite dans les localités infectées de la maladie." In an explanatory ministerial circular, issued in August, 1882, it is mentioned that inoculation is adapted only "au local, l'enclos, l'herbage, ou la pâture, dans lequel se trouve l'animal malade et aussi, bien entendu, les animaux du même propriétaire ou de propriétaires différents qui ont cohabité avec l'animal malade et ont pu recevoir de lui les formes de la maladie." Of course, the term "localities" may be made to include entire districts in which the disease exists, and in which inoculation may be practised with the object of diminishing the ravages of Contagious Pleuro-pneumonia.

That there can be any danger of extending the disease by the practice of inoculation there is no reliable or definite evidence to show; and the fact that the measure is prescribed by the sanitary laws of such countries as France and Holland, is sufficient to re-assure those who take this risk into consideration. Those who are in the best position to give an opinion, maintain that there is no such danger; and the case given by Reynal with such circumstantiality, in which inoculated cattle were

supposed to have infected healthy ones at the Alfort Veterinary School, was alluded to at the International Veterinary Congress, held at Brussels three years ago, when the late M. Bouley (Director of the School when the occurrence was reported) asserted that Reynal had made a mistake, and that he never knew inoculated animals infect others merely because they were inoculated.

The danger from this source, therefore, appears to be non-existent. The real danger, however, lies in slightly diseased animals—those in which the symptoms are inappreciable, or so slight as to be easily overlooked—being inoculated, and on the faith of their being safe to mix with healthy stock, allowed to associate with them, and so infect them from their unsound lungs. This risk, of course, can be greatly diminished by careful examination, but that it can always be averted it would be hazardous to maintain, knowing the difficulties attending the perfect exploration of an ox's chest. It therefore becomes an important question, in combating the disease, whether inoculation should be adopted except in special circumstances, as when only one or two animals in a valuable herd are found diseased and it is desired to save the others, or when the disorder prevails widely and destruction of whole droves would be necessary to extirpate it, as in Australia and South Africa, and to some extent in the United States of America.

EXPERIMENTS WITH THE VIRUS OF RABIES.

THE most important news in connection with this subject comes to us from Vienna in the account of Professor von Frich's experiments with the virus of Rabies supplied to him for that purpose by Monsieur Pasteur. M. von Frich finds: (1) That in animals which have died from Rabies the virus exists in its most concentrated form in the central nervous system. (2) That small quantities of the cerebro-spinal substance of animals which have died from Rabies injected under the dura mater by trephining are sure to be followed, after a latent period of from fourteen to twenty-one days, by the same disease, and this may be transmitted from these to other animals. (3) That the same disease, with the same symptoms and the same period of incubation, may be induced by intra-cranial inoculation with particles of medulla from human beings who have died of Rabies, showing the identity in man and in the lower animals. (4) That infection is less sure by the subcutaneous method, and the period of incubation longer than with intra-cranial inoculation. (5) The length of the period of incubation depends upon the quantity of virus injected under the skin; the less the virus the longer the incubation. (6) By the continuous intra-cranial transmission of the virus taken from the cerebro-spinal substance of rabbits, after a series of generations the period of incubation is shortened and its invasion is irregular. Later on the incubation still decreases, but the invasion becomes regular. (7) The *fixed virus* of an incubation period of seven days, which M. Pasteur obtains by inoculation from rabbit to rabbit through forty or fifty generations exceeds in intensity the virus of *street Rabies*, not only in that the invasion of the disease is earlier, but also because the animals die without exception as well after subcutaneous injection as with inoculation of the dura mater. (8) The fixed virus does not seem to acquire by further transmissions any noteworthy shortening of its period of incubation. Sometimes the disease

begins after six days; but, on the other hand, it may extend to eight, ten, or even twelve days. An incubation period of from eight to twelve days, and consequently a virulence of the same intensity as that of the fixed virus, may also be obtained by the transmission of street Rabies, and this sometimes at the second or third generation. (9) M. Pasteur's method of obtaining a fixed virus of seven days' incubation is, perhaps, not the only one, for the said virus may sometimes be obtained much earlier, independently of the transmissions, and this virus is constant in its effects and in its period of incubation. (10) The virulence of particles of medulla diminishes daily under desiccation at 20° Centigrade over caustic potash, and is entirely destroyed after from fourteen to sixteen days. (11) Animals which have been subjected to hypodermic injections of a series of virus attenuated by desiccation become refractory to the stronger virus by the previous inoculations with the weaker virus if the stronger virus have not been used in too rapid succession. (12) Animals which have been inoculated hypodermically during ten days with virus of progressive virulence (medulla from ten days to one day) have not been refractory to infection with the fresh virus of street Rabies, and have only exceptionally escaped after intra-cranial infection. (13) Rabbits and dogs inoculated by trephining with the virus of street Rabies of sixteen days' incubation have always succumbed, notwithstanding the preventive treatment already described. (14) M. Pasteur attributed to the method of slow vaccinations the unsatisfactory results obtained previously by M. von Frich, and recommended a more intensive mode of treatment. The experiments carried out conformably to M. Pasteur's instructions have given no more favourable result; all the animals died of Rabies. (15) The experiments have demonstrated a most important fact—that is, that in the rapid process the weaker preservative medullæ do not confer the same certainty of immunity from the effects of inoculation with the stronger medullæ. Of a series of dogs and rabbits inoculated as a control-experiment to that described in the preceding paragraph, and in which the rapid process was carried out without previous infection, most of the animals died of Rabies. (16) Most of the animals which were submitted to the preventive treatment after subcutaneous inoculation with street Rabies, died of the disease even when the period of incubation was thirty-four days. These experiments show, says M. von Frich, that Pasteur's method of rendering animals refractory to Rabies is not yet either sure or certain. There is not yet a sufficient scientific basis for the application in man of a preventive treatment after the bite of a rabid animal. It is, moreover, quite possible that the preventive treatment, at any rate the intensive method recently recommended by M. Pasteur, may itself transmit the disease.

That the latter opinion is entertained by some medical men is shown in a recent discussion which took place at the Academy on a case of Hydrophobia communicated by M. Peter. The subject of the observation had been bitten six weeks before, and had undergone the intensive treatment within forty-eight hours. Four days before his death he was seized with pains, which radiated, not from the cicatrix of the bite, but from the points where the inoculations had been practised. He then fell into a state of stupor and prostration, and died in a paralytic condition, foaming at the mouth. M. Dujardin-Beaumetz contested the value of the observation on two grounds: in the first place because the existence of Rabies had not been confirmed by experimental transmission to the animals by inoculation with diseased medulla; and, secondly, because most of the symptoms usually seen, more particularly the spitting, had not been mentioned by M. Peter, and because the paralytic form of Rabies, of which the patient was said to have died, was extremely exceptional in man. M. Verneuil begged the

Academy not to be influenced by communications such as that of M. Peter. Let M. Pasteur's work be disproved, if such is its fate, said the speaker, by scientific argument, and not by gossiping tales. M. Peter, in reply, remarked that no one could contest the fact that the man was dead. That he had been bitten and had undergone the intensive treatment were equally sure. These circumstances formed a "natural series," and had the inoculations not been performed, no one would have doubted that the case was one of Rabies. M. Dujardin-Beaumetz had pointed out that the paralytic form of Rabies—that which follows, as a rule, laboratory inoculations—is excessively rare after a dog-bite. But, said M. Peter, this is a point of great importance. The man had been subjected to inoculations, and had died with symptoms of Rabies such as are not usually met with in Hydrophobia, but which are those that do occur in experimental Rabies, and that have already been observed in England in those dying of the disease after Pasteur's treatment.

EXTRACTS FROM A PAPER ON NAVICULAR DISEASE IN HORSES.*

BY VETERINARY SURGEON FARNBACH, ASSISTANT IN THE INSTRUCTION-FORGE OF THE ROYAL VETERINARY SCHOOL AT DRESDEN.

THE examination of a chronically inflamed navicular joint, induces me to give a description of the appearances it presented, and to offer a few remarks upon the subject of so-called Pedal Arthritis—inflammation of the navicular—in the horse, referring more especially to the etiology and literature of the subject.

A horse which had suffered for two years from navicular disease, was destroyed for entozoa, and I seized the opportunity to make a close examination of the feet, for the purpose of investigating the changes in the parts.

I found the following:—The flexor tendons upon their anterior surface, on both sides of the median groove, by means of which they glide over the central prominence of the navicular bone, had rough portions, which ran downwards and joined. Those parts were plainly distinguishable from their smooth and fibrous surroundings.

They were rough, diffused, and about 1½ cm. long, and ½ cm. broad. The tendon had lost its glistening appearance, was disintegrated, and several isolated fibres appeared to be torn. Each fibre stood out distinctly and isolated, and the insterstitial connective tissue was hypertrophied, glistening, and as if swollen, and partly softened from maceration. These changes could be recognised farther down the tendons, as far as their attachment to the pedal bone, but with this difference, that the disintegration of the deeper parts was more minute, and less striking to the eye.

The navicular bone showed upon its posterior protuberant gliding surface several irregular, isolated, greyish-brown spots, which were seated upon both sides of the central protuberance.

They were rough upon their surface, as if punched out, and allowed the bone-substance to be seen. Upon the left half, near the middle protuberance of the gliding surface (see Fig. 1, *c*) there were two irregular roundish blemishes of the size of a shot-pellet, whtch penetrated several millimetres into the bone-substance; they were gulf-like (*buchtig*), as if eaten out, and porous.

Upon the right side of the middle protuberance, there was a brown place, the middle of which was beset with a few woodworm-like holes.

* Translated by F. Raymond, F.R.C.V.S., A.V.D., from the "Deutsche Zeitschrift für Thiermedecin und Vergleichende Pathologie," 12th vol., 4th and 5th parts.

The capsular ligament presented nothing abnormal beyond a certain amount of swelling. The pedal joint was perfectly free from disease.

In consequence of these appearances the diagnosis was "chronic inflammation of the navicular gliding apparatus" (Fussrollen eatzundung).

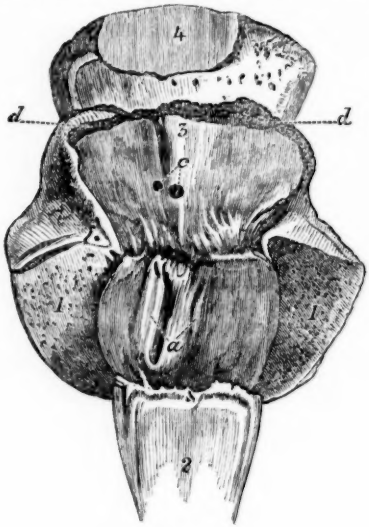


Fig. 1.

Fig. 1 represents the pathologico-anatomical lesions in the navicular apparatus. 1, Pedal Bone; 2, Perforans Tendon drawn backwards; *a* and *b* are the rough disintegrated parts of the same; 3, the navicular bone; *c*, woodworm-like holes in the substance of the bone; *d*, upper edge of the navicular bone.

The term "chronic navicular arthritis," which is still in considerable use, must be considered as incorrect, for the gliding apparatus of the navicular joint is not identical with the joint; nor is it a joint, but as is known, merely a roller or slide, provided with a lubricating bursa for the flexor tendon, and is completely apart from the navicular joint.

The word "chronic" is often misapplied, for every inflammation of this part is frequently termed "chronic," whereas experience teaches that this process, as occurs in every other part, may run an acute course.

Navicular disease (Podotrochilitis) is an inflammation of the gliding apparatus, which, according to the age of the disease, brings about changes in one or the other, sometimes of all the parts of the apparatus, as the case in question well illustrates. The parts implicated are the gliding surface of the flexor tendon, that of the navicular bone, the lubricating bursa, and even the navicular bone itself.

The disease has been repeatedly the subject of numerous investigations, and English veterinarians, in particular, have been useful in bringing about a better knowledge of it. The opinions as to the pathogenesis of navicular disease were originally very varied.

According to William Williams, Coleman considered it to be due to contraction of the hoof. Professor Dick put it down to rupture of the flexor tendons; Bruell said it was either a bursitis, or an inflammation of the navicular bone. Broad, of Bath, thinks it is an inflammation of the inferior gliding surface of the navicular bone, resulting in exostosis, caries, and disintegration of the flexor tendon.

According to Gerlach, the disease originates in sudden contusion and inflammation of the tendon, synovial bursa, and gliding surface of the navicular bone.

William Williams, who has treated the subject very exhaustively, after weighing all the circumstances, arrives at the conviction that the disease has its seat in the cancellated tissue of the navicular bone, or in the cartilaginous covering of its gliding surface, and that concussion or rheumatic diathesis is the origin.

All these authors acknowledge as a fact that in most cases the tendons bursa and the navicular bone are attacked with inflammation, and undergo pathological change. In the bone, the disease is supposed to attack either its gliding surface or the cancellated tissue which lies under it.

It will also be gathered from the literature that the opinions as to the original seat of the inflammation differ widely, and that some put it down to a synchronous origin in all the parts belonging to the gliding apparatus—others only in the bursa, or only in the tendons or only in the bone—and assert that the inflammation spreads into the other parts.

After this introduction let me also submit my views upon the pathogenesis and etiology of navicular disease.

The causes of navicular disease are, as in every other disease, partly predisposing and partly induced. The predisposition is to be found in the peculiar anatomical conditions of the horse's foot. The induced cause is (excepting from injuries) mostly to be sought in the abnormal conditions under which the horses work. The meritorious labours of Peters have shown that these factors play an important *rôle* in foot diseases.

The flexor tendons of the horses' foot are to be compared with an elastic band (spann band). When the weight of the body, in progression, falls upon the fetlock joint, the tendon, as well as the suspensory apparatus of the sesamoid bones, becomes enormously strained. The greatest strain occurs where the flexor tendon plays over the sesamoids and over the navicular bone. Those convexities, which have been least protected against the shock, naturally suffer most from its effects. The greatest weight falls upon the fetlock-joint when the foot is put down, but certain anatomical arrangements, particularly the suspensory apparatus in *front* of the flexors, and the elasticity of the tendon itself, undertake a considerable part of the weight (concussion), so that the tendon, which is behind the suspensory ligament, is greatly protected from injury. Nevertheless, this convexity at the back of the fetlock is a "locus minoris resitentiæ," which is not to be overlooked.

Bruell mentions a case in which the flexor pedis perforans of a horse with oblique pasterns (bärenfüssigen stellung), therefore with considerable tension upon the tendons, suffered from a considerable rupture at the convexity of the fetlock, over the sesamoids. He states that it showed other pathologico-anatomical lesions, connected with this oblique condition of the limb, similar to those found in navicular disease.* The normal anatomical predisposition to overstraining of the tendon at breaking or bending point, was in this case increased by its unnatural position to the extent of becoming a pathologico-anatomical predisposition.

* An exactly similar case of rupture of the flexor tendon is described by Professor Siedamgrotsky in the Reports of the Veterinary Department of Saxony for 1886, page 44.

The relations of the perforans tendon are normally still more unfavourable, where it bends round the navicular bone.

As we said before, the tendon above or below the fetlock is protected from shock by the suspensory apparatus, and by its own length and elasticity. We find at the navicular bone no, or few, protections of this description. This want should receive all the more attention, because it has never been considered in the etiology of navicular disease.

In my opinion, a comparison of this part with the back of the fetlock gives rise to the following considerations:—

There is wanting at the back of the navicular bone, the arrangements for the direct checking of concussion, which are present at the fetlock, represented by the suspensory apparatus. The ligament, which may be compared with the suspensory ligament, is the superior ligament of the navicular bone; but it acts principally as a suspender for the navicular bone, and not as an elastic band to check concussion.

The concussion caused by the descent of the navicular bone upon the perforans tendon, falls therefore unweakened upon the tendon. Now, the

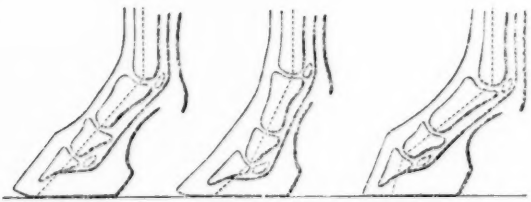


Fig. 2. Fig. 3. Fig. 4.

Fig. 2.—Normal axis of bones; the bones of the pastern, etc., are in one direction.
Fig. 3.—Broken axis, caused by the toes being too long, the heels too short, and the fetlock upright.
Fig. 4.—Axis broken to the front, caused by the toes being too short, the heels too long. The fetlock has sunk backwards.

length of the tendon, from the navicular bone to its attachment to the pedal bone, is very short, (Fig. 2); so that without employing mathematical formulæ, one is justified in stating that as these parts are shorter than those above, their elasticity must be less.

When the shock occurs, by the descent of the navicular bone, the fibres of the perforans, between the navicular and the pedal bone, are less capable of extension than those situated above, which are longer.

This short piece of tendon behaves, therefore, like a short tensely stretched rope, which in virtue of its brevity possesses little power of stretching, and is therefore still less in a position to bear any extra shock. The more perpendicularly the shock falls, the greater the strain will be. This last point is important, and leads to further considerations of the etiological relations of the anatomical difference between the fetlock and the navicular apparatus, which have hitherto never been regarded.

Given a tendon situated at the posterior part of a joint, and supposing the joint and the tendon form an angle with its apex directed backwards, then it is a physical fact, that the nearer the angle approaches a rectangle, the greater will be the strain upon the tendon.

The construction of a parallelogram of the forces will prove this. The

shock acts less in the direction of the axes of the bone and falls more perpendicularly upon the tendon.

The more perpendicularly the weight falls, the greater will be the demand upon the tendon.

If, starting from this undeniable proposition, we consider the fetlock and navicular, we see that even under perfectly normal circumstances, the strain is put upon the perforans tendon under much more unfavourable conditions at the navicular than at the fetlock. For, whereas this tendon in a normal position, forms an angle of 150° to 160° at the fetlock, the angle amounts to 130° only at the navicular. Add to this, what I have already mentioned about the relatively unweakened force of the shock, owing to decrease of elasticity in the tendon near the navicular, causing diminution of protective means, then these results most incontestably prove an anatomical predisposition to Pathological process in the region of the navicular, which one is justified in calling a normal anatomical predisposition.

This predisposition is not equal in the fore and hind feet, but is much diminished, as experience shows, in the hind feet; and for several reasons. Firstly, because the hind legs are always proportionately less laden than the fore, and also because not only the tendons, but the entire posterior half of the foot, are considerably relieved from weight.

In the hind legs, the weight falls mostly upon the anterior part of the foot, because the long axis of the three lowermost bones of the foot is more upright.

In conclusion, it is proved by facts that disease of the posterior half of the foot of the hind extremity rarely occurs, and inflammations of the navicular are practically unknown there. The reason is, that the fore feet have to support more weight than the hind, and consequently there is more tension put upon the tendons.

Nature has endeavoured to do her utmost to give compensation for all these unfavourable conditions to the navicular, and has arranged a natural support, an elastic cushion under the tendon, to relieve the strain as much as possible. This useful and indispensable pad can only act when it has support in its turn, i. e. counter-pressure from the ground. The closer this counter-pressure, within natural and physiological bounds, is brought into play, the less will be the predisposition to navicular disease. On the other hand, if the pressure is wanting, the tendency will increase.

This anatomical disposition to pathological change, which is normally present in the navicular, particularly of the fore feet, can under certain circumstances increase to such an extent that it becomes a pathological predisposition.

It has been mentioned by several authors, as a well-known fact, that upright narrow feet are specially predisposed to navicular disease.

This is easily explained by the want of counter-pressure on the frog, which leaves the tense tendon without, or with insufficient, support from the pad.

Experience also teaches that sloping, flat feet are not more subject to navicular disease than normal feet; although this shape causes more weight to be thrown upon the posterior part of the hoof, therefore upon the tendon and navicular. The cause for this comparative immunity is, that the frog in these feet is fully developed, and offers an efficient pad for the support of the tendon.

This natural predisposition to disease of the tendon in the region of the navicular is greatly increased, whenever the axis of the bones deviates from a straight line (dotted line in figures 2 to 4). This is the case when the axis of the bone is bent backwards, *i.e.*, when the toe is in a normal or acute angular position, and the suffraginus and coronary bones are more perpendicular to the ground than the hoof (see fig. 3). This defective direction of

the axis of the bone may be congenital, or acquired by faulty preparation of the hoof, (toes too long) or neglected shoeing. In all such cases, the too upright position of the suffraginus and corona throws too much weight upon the posterior part of the hoof, because the corona rests with more of its articular surface upon the navicular than it would in a normal or contrary position. This causes *ipso facto* a greater strain to be thrown upon the tendon; the angle of flexion at the navicular thereby approaches a rectangle, and as has been demonstrated already, the weight thus falls more perpendicularly upon the tendon. In this position the fetlock is relieved of weight at the expense of the tendon at the navicular.

To prove that such an abnormal posterior deviation of the axis of the bone has really so damaging an effect upon the tendon and navicular, indeed, that it is, perhaps, a most important, until now entirely neglected factor in the etiology of navicular disease, let fig. 4, a contrary case, be examined, with the axis of the bone deviating forwards.

As in the first position, the predisposition to disease by overstraining is increased, so in the latter the predisposition is decreased, and the most favourable position procured for the tendon and the navicular.

The fetlock joint is bent backwards, the coffin joint is inclined slightly forwards, and the inferior articulatory surface of the corona rests mostly or altogether upon the pedal bone. The shock which is diminished by greater obliquity of the fetlock, falls upon the anterior half of the foot.

The tendon suffers little or no strain by the navicular; thus the part is protected in the best imaginable way from traumatic effects and disturbances, because the tendon at the navicular is relieved of weight at the cost of the fetlock.

The actual cause of the inflamed or sprained condition of the tendon, when the predisposition is either normal or pathological, is generally high action in riding horses, or immoderate exertion in draught horses, particularly in starting the load.* Finally, shoeing with short shoes is favourable to the development of the disease, for it causes increased weight to be thrown upon the posterior half of the foot, and caulkins also have a predisposing effect, for they prevent counter-pressure on the frog, and destroy its action as an elastic pad.

The effect of these pernicious methods of shoeing is a simple inflammation, or a rupture of the tendinous fibres, which are unable to resist the extra strain caused by the weight thrown into the saddle or collar.

The rupture occurs, as a rule, where the shock falls heaviest upon the tendon; therefore upon that part of it which is under the navicular, as it descends, in consequence of the shock, or where the tendon is inserted into the pedal bone, and finally between the supported part and the insertion.

The pathological anatomical lesions will depend upon whether the case is a stretching, or an inflammation, or a rupture of the tendons; and the course and termination of the disease will also depend upon these data.

We distinguish two principal forms of navicular disease.

A. Acute navicular inflammation which consists either:—

1. In an inflammation of the tendon, resulting from the causes already described. A sprain of the tendon may occur, which sets up inflammation, which, in its turn, causes exudation into the interstitial connective tissue.

Or, at the same time:—

2. In an inflammation of the synovial bursa (Bursitis). Owing to the intimate relations of the tendon with the bursa, which covers the navicular at its postro-inferior part, an inflammation of the tendon may call forth similar disease in the bursa.

This form of navicular disease has been rarely investigated. Pathologically,

* Peters: "Changes in the shape of the hoof."

it should not differ from ordinary Tendinitis and Bursitis. As both processes represent a simple form of inflammation, a re-absorption of the exudate in the tendon and bursa, and complete recovery, is to be expected.

This form of navicular disease should be described as the "acute," because it presents the character of an acute inflammation, and may terminate rapidly in complete recovery, if energetically treated. Should this not be the case (owing to an anomalous position of the limb, or form of the hoof, causing a predisposition to abnormal stretching of the tendon), then it passes into the chronic form.

B. Chronic navicular disease follows the acute form, or is engendered by primary rupture of the tendon, or by an inflammation which has preceded it.

1. Resulting from the acute form. If, in addition to simple exudation of serum, a considerable quantity of cells are thrown out into the interstices of the tendon, and extension of the interstitial cellular tissue takes place, owing to the leucocytes developing into connective tissue cells, and to proliferation of the pre-existing corpuscles; then there appears a chronic, uniform, or modular thickening of that part of the tendon attacked, which terminates in cicatricial shrinking of the same, which never entirely disappears.

The result is an anomalous position of the extremity of the limb, lasting pain, and lameness. In such cases the thickening of the tendon sometimes travels above the heel, and can occasionally be easily felt. This is not unimportant for diagnosis.

As in the tendon, so in the bursa, a fibrous thickening of its walls may take place from inflammatory infiltration, which renders the re-absorption of the serous exudate in the bursa, difficult—even impossible—chronic Hydrops.—More rarely, in chronic cases, adhesion between the tendon and the bursa, and formation of a so-called pseudo-ligament, may occur. This termination, as well as the thickening of the tendon, already alluded to, causes a predisposition to relapse. The more frequently the relapses occur, the greater will be the changes in the tendon and bursa, and they will end in the inflammatory process spreading to the navicular bone itself.

2. Resulting from rupture of the tendon. Rupture of the tendinous fibres follows upon sudden shock, and particularly so in the neighbourhood of the navicular; or from considerable strain to the tendon near its insertion into the pedal bone when starting a load.

The ruptured fibres, owing to their violent separation and elasticity, contract and are removed from that part of the connective tissue which contains their nutrient vessels. They become necrosed, and by the chemical produce of their decomposition, they set up in the surrounding tissue an inflammation, which tends to bring about their absorption. But as the wandering leucocytes, which take such an important part in the removal of pathological products (*Phagocytes*, Metschnikoff), have great difficulty in performing their duties, owing to the resistant power of the tendinous fibres, this reparatory process of inflammation acquires a chronic character. A part of the great number of exuded leucocytes undergoes fatty degeneration, breaks up, and, mixed with the serous portion of the exudate, becomes an emulsified mass of detritus. This mass, in the first instance, tends to soften the necrosed parts of the tendon, and thereby to bring about more rapid absorption, but at the same time, the irritation of the capillaries of the tendon and bursa causes further disturbance of a kind unfavourable to recovery. The inflammatory process does not remain confined to the immediate neighbourhood of the necrosed fibres, but spreads gradually over larger portions of the tendon. Through the inflammation creeping into the neighbouring interstices, these also become infiltrated with exudate, and as they swell, the individual fibres become more and more isolated, and thereby their power of resistance becomes diminished.

By friction and stretching, from weight and so on, secondary ruptures take place, and by this means the destructive process in the tendon may continue to spread farther and farther, to such an extent that nothing remains of the tendon but a transparent layer, through which the elastic pad can be seen (Brauell).

Early in the course of these important disturbances in the tendon, the cartilage of the gliding surface of the navicular becomes irritated by the constant presence of the chemical products of decomposition, and by the friction of the disintegrated fibres of the tendon. This brings about a diseased state of the cartilage, leading to ostitis of the bone. The alterations in the cartilage take place primarily in those parts which are most intimately connected with the diseased tendon—*i.e.*, in the under part of the gliding surface and upon the central protuberance. The cartilage in one or more places becomes opaque, and loses its glistening appearance, There is a proliferation (Wucherung) of the cartilaginous cells, which rapidly undergo fatty metamorphosis. The result is a softening of the cartilaginous parts concerned; the parts can oppose no resistance to the constant friction of the diseased tendon. The cartilaginous layer at these points becomes thinner and thinner, reddish-brown in colour, and in the end allows the bone to be visible through it.

Finally, the bone is left bare. A rarifying ostitis follows. The medullary tissue of the Haversian canals of the bone becomes converted into a vascular, cellular granulation tissue, owing to Hyperæmia and inflammatory exudation. At the same time the bone disappears, either through pressure caused by this new growth (Billroth), or chemical influence of the peculiar giant cells of the growth (Osteoclasts, Kölliker), or absorption through increased absorbent power, due to increased circulation (Volkemann, Rindfleisch, and others). The Haversian canals become larger and larger, and the void thus caused becomes filled with the granulation tissue. The bone thus acquires the eaten-out (angrfressene), porous, and withal sanguineous condition which is apparent microscopically in earlier stages. The termination of this form of navicular inflammation brought about by the irritating effects of the tendon, deserves our special attention.

a. If the destruction of the gliding surface of the tendon is not very extensive, a reabsorption of the necrotised fibres is possible, and the defect is filled up with cicatricial tissue, formed from the granulation tissue, and complete recovery ensues. In such cases, recovery from the primarily inflammatory influences in the tendon may be followed by recovery from the secondary process in the navicular bone. The regeneration of the cartilage cells is brought about by a quickened proliferation of the surrounding intact ones, and the granulation tissue which occupies the enlarged medullary spaces becomes converted into Osteoides, and finally into solid bone tissue. The rarifying ostitis becomes converted into a condensing ostitis. In this way, a progressive tissue metamorphosis may lead to a complete recovery. It is often easy to demonstrate that inflammation has taken place at some longer or shorter bygone period by making sections of the bone. These will show that ostitis has caused a condensing of the bone tissue.

This condensation may be complete or partial. In the latter case the bone may be found to be in a palpably porous state in some places. The rarifying ostitis has then only partly been replaced by condensing ostitis, owing to the process having been stopped by the death of the animal.

In William Williams' work there are drawings of several such bones.

b. Recovery may take place, even when the disease has made greater progress. The bone may have deep ulcers; there may be a striking porous condition; the tendon may appear quite transparent; indeed, according to Brauell, it may be upon the point of rupture. Notwithstanding this state,

recovery may take place in the following way:—The granulation tissue growing from the bone on one side and of the tendon on the other may join, and thus cause adhesion of the two parts; providing that excessive rarification of the navicular has not brought about its fracture, as sometimes occurs.

Besides the changes found in the tendon and in the gliding surface of the navicular bone, it should be particularly noticed that, in consequence of the inflammatory process creeping into the periosteum of the navicular and pedal bones, osteophytes may be thrown out upon the edges of both the bones, and also upon the anterior and lateral surfaces of the corona. These may bring about a consolidation of the navicular with the pedis, or of the pedis with the corona. There is naturally also a possibility that the capsular ligament may be attacked, thus giving rise to a *bonâ fide* arthritis of the pedal joint; indeed it may cause a genuine chronic inflammation of the joint, but a perusal of the literature and reports upon the subject shows that it is a very rare occurrence, although the immediate neighbourhood of the joint, and the thinness of the capsular ligament might lead one to expect the contrary.

It will be gathered from the above that the pathological changes in the navicular may be of the most diverse description, according to the form of inflammation. It is, therefore, not surprising that mere contemplation of these pathological data, without tracing them to their genesis, has caused the origin of the disease to be accounted for in different ways. Lesions of the navicular bone can, at the utmost, tend to strengthen the opinion of those who seek the primary origin of the disease in the cancelli of the bone. I believe that I have done sufficient to demonstrate that disease of the navicular bone may exist without our being forced to the conclusion that it is the primary starting-point of all other changes. Nevertheless, the possibility of primary disease of the navicular is not to be denied off-hand. But it is, at least, very rare. The views of those who place the origin of the malady in the navicular bone are represented by the English author, W. Williams. He maintains that it is caused by excessive pressure (compression), exercised upon the navicular by the corona, through the fetlock being too upright. If this opinion were correct, this pressure would cause an ostitis in the bones. In that case, according to my views, the disease should occur much earlier and more often upon the side submitted to the most direct pressure (*i.e.* the articulatory facet) than upon the gliding surface in apposition to the tendon and pad. But disease of the navicular upon its coronal articulatory surface has not been noticed, as Brauell points out—at least, he has never observed such a case. I have not found any case recorded in literature of the disease, wherein the disease showed itself, primarily, upon the articulatory surface, but invariably upon the gliding surface, *i.e.*, that in apposition with the tendon.

Williams points out, in support of the correctness of his views, that navicular ostitis occurs very rarely in the hind feet. "If the disease had its origin in the tendon, it must be witnessed far more frequently in the hind feet, because the flexors of the hind limb are called more powerfully into play in motion or in drawing a load." These tendons, like all others, are stretched when at work, but, besides this, the weight sustained by them must also be considered. This weight is comparatively light upon the hind legs. In draught and backing, the legs are brought under the body, the fetlock sinks backwards, and there occurs, temporarily, a position similar to that found in oblique fetlocks, as far as the direction of the axes of the bones is concerned. The entire load rests upon the suspensory apparatus of the fetlock, which nearly touches the ground, whereas the tendon at the navicular suffers no unusual strain from it, because the corona rests almost entirely upon the pedal bone. In starting the load, a labour which also falls upon the flexors, the work is facilitated by the toe of the hind foot being short and upright. In

addition to this, the hind legs are always less weighted, as has been already stated.

On the other hand, the fore feet, when starting a load, carry by far more weight upon their posterior half (causing greater strain upon the tendon), because the entire forearm is under the body in draught. The fetlock is placed more uprightly; the corona rests upon the navicular, with almost its entire articulatory surface. Thus the increased labour is not thrown upon the hind, but upon the fore flexor tendons, because they have to carry an extra weight already. For this reason, and because of the extra length of the toes, the strain falls heavier upon the fore tendons.

Therefore, the rarity of navicular disease in the hind feet is a proof in favour of its origin in the tendon, and is not, as Williams considers, a proof of the contrary.

Résumé—In navicular disease the primary lesions are those of the tendon, and those of the cartilage and of the bone are secondary, as a rule. The tendon becomes diseased owing to predisposition, caused by its anatomical relations; the cartilage and bone of the navicular suffer by the friction of the ruptured fibres, and by the presence of the chemical products of decomposition of those fibres. The spread of the malady to the navicular bone is due to mechanical and chemical irritation, and not to rheumatic diathesis or other causes. The disease is acute or chronic, according to the amount of inflammation and organic change in the tendon. That form of inflammation which originates in rupture of the fibres, runs the longest course, and brings about the greatest changes in the gliding apparatus.

PASTEUR AND HIS WORK, FROM AN AGRICULTURAL AND VETERINARY POINT OF VIEW.

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(*Continued from page* 412, *vol.* xxiii.)

From this it will be seen that the report of the Commission, to which Germany seems to have attached so much importance—judging from its composition—was entirely in favour of Pasteur's discovery; and it was concluded that on large farms where Anthrax is more or less prevalent, it would be advantageous and economical to protect the animals (*herbivora*) by inoculation, especially the cattle, as it is not so dangerous for them as sheep, while they are more valuable.

It should be stated that all the sheep and cattle remaining from the experiments, and which had been protected, had been turned out to pasture upon the infected farm, and seven months afterwards they were still in good health; though some of the lambs born from the ewes subsequent to the experiments died from Anthrax.

There can be no doubt that in countries or localities where the malady prevails, protective inoculation, when properly practised, must prove an immense boon. In India, for instance, which is in the unenviable position of having nearly, if not altogether, every contagious disorder to which animals are liable—Cattle-plague, Foot-and-mouth Disease Sheep-pox, Glanders, Rabies, Anthrax, etc.—causing a loss, at the lowest estimate, of six million pounds sterling a-year, and with scarcely any attempt at a remedy—protective inoculation for the prevention of Anthrax among horses alone would prove of great benefit to our mounted corps there. And what would it not save if it could be applied to all these devastating plagues of animals which revel almost unchecked all over India? Already the possibility of obtaining such

benefits have been shown by Mr. Mills, of the Army Veterinary Department, who at Madras, in 1884, conducted a series of experiments on ponies, donkeys, cows, bullocks, buffaloes, sheep, and guinea-pigs—in all eighty-eight animals, with marked success. And Mr. Frost, of the same Department, appears to have been equally successful in Burmah; so much so, that the agents of the Bombay-Burmah Trading Corporation have expressed their intention of having their elephants in the Mingyan and Chindwin Valley forests inoculated against attacks of Anthrax, which is very destructive to these creatures in that country.

Some parts, and often the best, the fertile *vleys* or valleys of South Africa, are deadly localities for horses at certain seasons of the year, because of the dread *Paard Ziekte* (horse-sickness). That this is a germ disease there can be no doubt whatever; because a horse that has recovered from it, which is rare, is believed to be safe from another attack—is what is called "salted," and is therefore very much more valuable than one which has not had the disorder. Besides, the germ which causes it has been identified, and successfully inoculated in guinea-pigs. The disease is of the nature of, if not identical, with, Anthrax; and the Pasteurian inoculation would, it may safely be predicted, protect all the South African horses in the places where they would perish wholesale, if exposed.

In an immense empire like our own, the greater portion of which is agricultural, and nearly every part of which is haunted and harassed by contagious diseases among the animals useful to man, and so essential to his welfare, this method of guarding against disorders which are generally fatal and rarely amenable to medical treatment, should have wide and most beneficial application, and especially when it can be resorted to for all of these maladies.

But to return to Pasteur's researches in Anthrax.

Still pursuing his investigations with regard to that disease, and Fowl-cholera, and having subdued the virulence or microbe of these to his will, bringing them down to a point where they could not multiply in the bodies of animals inoculated with them, and still keeping these organisms alive in suitable media, he demonstrated that these now non-virulent microbes could be restored to their pristine activity, and rendered capable of living and multiplying in the blood of animals. An attenuated anthrax virus, which would not affect a guinea-pig even a week old, will yet kill one just born, or one or two days old; and if some of the blood of this is inoculated into an older one, this also will perish; while should the blood of this, again, be injected into a still older one, this will succumb; and so on through a series, until at length the blood has acquired such power that the old guinea-pigs, sheep, and finally oxen, are unable to resist the smallest drop of it. It is the same with Fowl-cholera. The most attenuated and harmless cultivation of the microbe can be made as deadly as ever, by passing it successively through small birds and chicken, until it is capable of destroying full-grown poultry.

The attenuation of the poison of contagious diseases by the air, suggested to Pasteur the possibility of the great epidemics of mankind (and for that matter also, the epizoötic diseases of animals), being modified or extinguished, and reappear or become more intense, through the same agency. "The accounts which I have read of the spontaneous appearance of the Plague in Benghazi in 1856 and 1858," he says, "tend to prove that this outbreak could not be traced to any original contagion. Let us suppose, guided by the facts now known to us, that the Plague, a malignant disease peculiar to certain countries, has germs of long duration. In all these countries its attenuated virus must exist, ready to resume its active form whenever the conditions of climate, of famine, or of misery present themselves afresh. The condition of long duration in the vitality of the germs is not even indispensable; for, if I may believe the doctors who have visited these countries, in all

places liable to the Plague, and in the intervals of the great outbreaks of the epidemic, ceses may be met with of people attacked with boils, not fatal, but resembling those of the deadly Plague. Is it not probable that these boils contain an attenuated virus of this disease, and that the passage of this virus into exhausted bodies, which abound only too freely in periods of famine, may restore to it a greater virulence? The same may be the case with other maladies which appear suddenly, like Typhus in armies and in camps. Without doubt, the germs which are the cause of these diseases are everywhere scattered around, but attenuated; and in this state a man may carry them about with him, or in his intestines, without suffering much, if any inconvenience. They only become dangerous when, through overcrowding, and perhaps successive developments of them on the surfaces of wounds, in bodies enfeebled by disease, their virulence becomes exaggerated."

The manner in which animals became infected with Anthrax also engaged Pasteur's attention, now that it had been definitely established that it was due solely to a microbe or its spores. This organism is now well known to all pathologists as a rod-shaped body, multiplying, when allowed oxygen or air, by dividing across, and measuring from $\frac{1}{12500}$ to the $\frac{1}{25000}$ of an inch in length, and about, $\frac{1}{15000}$ of an inch in breadth. It has an outer case or sheath, and inside this is fine granular protoplasm, the vital part of the organism. In this the spores appear as glistening points, which gradually become ovoid, and increase in size by the protoplasm collecting closely around them until they fill the rod or sheath, like peas in their pod; the sheath now either breaks off in segments, which burst, and the spores are set free; or it becomes softened and dissolves, leaving them at liberty in the middle of the pulp. These, as has been already mentioned, are extremely tenacious of vitality, and develop into the rod-like bodies or bacilli, when cultivated artificially, or introduced into the blood of animals.

When sheep, cattle, or horses at large become affected with Anthrax, this must be due to their receiving the spores from some external source; and that this may be the pasturage, was proved by an experiment, in which several groups of sheep were fed on grass which had been sprinkled with artificially-grown bacilli or their spores. Some died from Anthrax, and many survived after having been visibly affected—the period of latency being in some cases eight or ten days, in others much less. If prickly or stubbly plants, however, were added to the infected herbage, the mortality was very much increased. Experiments also confirmed the view to which this artificially infected herbage gave rise, that pastures become tainted by the excreta, which are often bloody, of living diseased animals, and by the blood and *débris* of those who have died or been killed, and buried on the spot. Adding some anthrax-blood to earth which had been sprinkled with yeast-water or urine, and keeping this at summer temperature, or at that which the fermentation of a dead body sets up around it—as in a dung-heap—the bacilli of the blood had, in less than twenty-four hours, multiplied and developed spores. Afterwards these spores were observed in their latent or resting condition, ready to germinate and produce the disease in animals, perhaps years afterwards.

To ascertain what really happens in ordinary circumstances, the earth from a grave in which a sheep that had died of Anthrax from natural infection, and the carcase of which had been inspected by Pasteur and his assistants, was examined ten and fourteen months after that event, and was found to contain spores of the bacillus. Guinea-pigs inoculated with these spores died from Anthrax. The same experiment was successfully made with soil from the surface of the grave which had not been disturbed since the burial of the sheep.

Experiments were carried out with earth obtained from trenches, in

which the carcases of cows dead of the disease had been interred at a depth of more than six feet two years before. Material was procured from this soil, which at once produced the disorder. On three occasions this happened, though nothing of the kind was exhibited in the earth from around these trenches. Notwithstanding the operations of ploughing, sowing, and reaping, the surface-soil of the graves still contained anthrax-germs. From the carcases of the dead animals the earthworms bring these germs, as well as those of putrefaction and others, to the surface; and these otherwise useful creatures, themselves unaffected, become the indirect cause of the disease in animals which graze on such ground.

M. Tisserand, Director of Agriculture in France, has remarked that the malady is unknown in the Savarts of Champagne, although this locality is surrounded by districts which are notoriously infected; if it chances to appear, it is owing to its introduction from without. Here the arable soil is not more than four or five inches thick, and lies on chalk; so that it is unfavourable for worms, and therefore the germs in the bodies of dead animals will remain in them, and the soil will not be tainted. It is on soils of the opposite character that Anthrax is most likely to prevail, if anthrax-infected bodies are buried in them. Impressed with this knowledge, Pasteur recommends that such bodies should never be buried in fields intended for cultivation, forage, or for pasture. If possible, a sandy or poor calcareous soil, dry and readily desiccated, should be selected, as it is not suited for earthworms.

But with all due deference to M. Pasteur, I would urge that, whenever and wherever animals die from germ-diseases, they be not buried, but burned. This is the only safe procedure with contagious maladies, and particularly in countries with rich and heavy soils; it is that which is resorted to by military veterinary surgeons in India, in disposing of the carcases of horses which die from that form of Anthrax known as "Loodiana Disease" so named from the country in Hindostan in which it was first noted as most prevalent.

While we are on this subject of Anthrax, it should be mentioned that a disease which was, until three or four years ago, considered as one of its manifestations, is now distinguished as a different malady, but, like it, is due to a microbe capable of artificial cultivation, and is then protective from the disease when inoculated. I allude to a most fatal disorder of young stock with which cattle-breeders in this country and in our colonies are only too familiar, and which, among a variety of local names, more or less peculiar or significant, is perhaps best known as "Black Quarter," but which is now technically designated "Carbuncular Emphysema, Erysipelas," or "Symptomatic Anthrax." It usually attacks the most rapidly thriving of young bovines, its onset being remarkably sudden, and its course strikingly rapid, the termination being almost invariably fatal. The chief symptom is sudden lameness —generally in a hind limb, swelling of the quarter from which, if the skin covering it is pressed upon, a crackling sound is emitted, due to the disengagement of gas from the large quantity of dark blood thrown out beneath, and which forms such a characteristic feature on dissection after death, as to give the disease its familiar name of "Black Quarter."

Incited thereto, probably by Pasteur's example, Arloing and Cornevin, Professors at the Lyons Veterinary School, and Thomas, a veterinary surgeon at Bassigny, France, have studied this malady, known as "Chabert's disease" in that country, and have demonstrated that it is very different from Anthrax, in that it is not communicable by inoculation of the blood, which that disorder most certainly is; that its microbe is like a large bacillus, but moves, and is only found in the affected limb among the serum, or deep among the muscles, to the fibres of which it adheres so closely that it can only be removed by scraping with a sharp knife; and that this organism, when injected into a vein, causes only a slight and brief disturbance of health, whereas the Anthrax

microbe would assuredly kill. Death is more rapid in this disease than in Anthrax, and the spleen is not involved, as in it. But the most valuable part of their discovery lies in the fact that they have established—that this direct (intravenous) injection safeguards the animals so operated upon from the mortal effects of the disease, either naturally or artificially, which occurs when the virus is introduced among the muscles. The protection has been found to last for more than two years; as cattle which had received the virus at that time were inoculated with a quantity of virulent muscle-pulp, but remained unaffected, while another bovine, which was unprotected, died on receiving one-tenth part of the dose. The virus does not seem to be capable of attenuation by cultivation, and its introduction into the blood through a vein is the most effective, and hitherto the most simple, means arrived at to save cattle exposed to infection from death.

This method, however, demands careful manipulation to prevent the inoculating material from escaping into the space between the skin and the vein, where it would set up the disease itself, and speedily destroy the animal.

It may be remembered that, a few years ago, Dr. Burdon Sanderson undertook some experiments for the Royal Agricultural Society, in contagious Pleuro-pneumonia of cattle, in which he sought to ensure protection by introducing the virus through a vein into the blood, instead of beneath the skin of the tail, as in the ordinary procedure. And as with "Black Quarter," so with this disease. The intravenous injection of the virus appeared to ensure perfect immunity against the lung disease; but there was great danger lest any of the virus should get beneath the skin during the operation, as it would give rise to so much local and general disturbance as in all likelihood to cause death. The microbes of the two diseases, while producing very little derangement to the health when imported directly into the blood stream, though bringing about such changes as will prevent attacks of their special maladies, yet find such a congenial *habitat* in the connective tissue immediately beneath the skin, as to multiply in appalling numbers within almost a few hours, and thus to destroy life. The safety of tail-inoculation for Lung Plague is probably to be found in the very small amount of connective tissue in that part, though the operation is no less certain in its results, so far as protection is concerned.

Pasteur has given his attention to another disease with which agriculturists, and pig-breeders and feeders, are only too well acquainted. I allude to Swine-plague, known in France as "Rouget," and in Germany as "Rothlauf." This malady has for some years assumed such a virulent and deadly character, and has attained such widespread dimensions in Europe and the United States of America, as to threaten the extinction of the porcine tribe within a brief space, if prompt sanitary or protective measures are not adopted. From its superficial resemblance to Anthrax, it was long looked upon as a form of that disease; but by Dr. Budd and a few veterinary surgeons, it was considered to be analogous to Typhoid Fever in man, and was consequently designated "Pig Typhoid." In August, 1875, having had the opportunity, while with the Royal Engineers at Chatham, for the first time of examining some pigs that had died of this disease at Higham, near Gravesend, I came to the conclusion that it was neither Anthrax nor Typhoid Fever, but a distinct disease of the swine tribe.* Some time after this (1877), Dr. Klein came to the same conclusion, and others were subsequently of this opinion; so that it is now decided that it is a disease peculiar to the pig. So far as experiments have shown, it can only be transmitted by inoculation to the rabbit, mice, and white rats, among mammalia; and among birds, according to Pasteur and Thuillier, Cornevin, and some other French investigators, the pigeon can be infected—very readily, say the first-named authorities,—but Klein denies this

* "A Fatal Eruptive Fever in Pigs."—VETERINARY JOURNAL, October, 1875, p. 269.

receptivity in pigeons. It is most infectious and contagious among pigs, in which it appears in two forms—acute and chronic; and its maintenance is due to an ærobic germ, different from that of Anthrax in being in the form of minute round granules or "cocci," single or double, as in a figure of 8, slightly motile, isolated, or collected in groups of two, three, or four. These are easily cultivated in the same manner as the anthrax rods or spores. The discovery of the microbe was made by Detmers in America (1882), and about the same time by Pasteur and Thuillier in France. Klein had previously found a bacillus, but this is not now acknowledged as the active agent. The germ exists throughout the body of the diseased pig, and especially in its *excreta*, which are very virulent. Infection is easy by the digestive organs; and, besides other modes of contamination, the food may receive the microbes by diseased mice, or through the medium of rats, flies, birds, etc.

In 1883, Pasteur made known a method of attenuating the virus, which, simple and effective, offers as certain protection against Swine-plague, when inoculation is properly performed, as Anthrax inoculation does against that malady. He found that when a pigeon was inoculated in the chest with the microbes of the disease, it died in six or eight days. When a second pigeon was inoculated from this, a third from it, and so on in succession, the microbe acclimatised itself in pigeons; so that death ensued more rapidly, and the blood of the last pigeon assumed much more virulence when introduced into pigs, than the most infectious products of a pig that had died of the natural disease. But the passage of the microbe through rabbits had quite a different result. When inoculated from a diseased pig, these creatures all speedily perished, but cultures of their blood in sterilised media became progressively easy and more abundant, the microbe somewhat changing in appearance. When pigs were inoculated with the blood of the last rabbits, and the results were compared with those obtained from the first, it was discovered that the virus had gradually lost its power; and though the blood of these rabbits made pigs very ill, it ceased to kill them. On recovery, they were proof against the fatal disease.

In various parts of France this swine vaccination has been carried out; but perhaps the most carefully conducted and extensive experiments were carried out in the Grand Duchy of Baden, in 1884, to test the value of the measure. In that country Swine-plague had caused heavy losses for many years, and in 1865 and 1871 commissions were appointed to report upon it. In 1884 it was arranged that a trial of vaccination should be made, under Pasteur's direction, the experiments to be carried out by one of his assistants, and the inoculating material and instruments to be supplied from his laboratory. The experiments were carried out at fifteen places on 237 pigs of different breeds and ages, and were under the observation of selected veterinary surgeons from Berlin, Munich, Stuttgart, Hesse, Alsace-Lorraine, Luxemburg, and Berne, as well as others. All the pigs were in perfect health, and the inoculations were performed in a similar manner to those on the sheep at Berlin. One-half the number were kept as test animals, and were not protectively inoculated. The second vaccination was made twelve days after the first, no ill effects following, except to six animals; and the final test was applied to all the pigs, in another twelve days, either by inoculating them with the deadly virus, or by feeding them on food mixed with it. The experiment was as conclusive as that at Pouilly-le-Fort, with regard to Anthrax. The pigs which had been protectively inoculated were unaffected by the crucial test, while those not so indemnified nearly all succumbed to the natural or imposed infection.

Rabies in animals is a disease which concerns people in general, from its terrible character when communicated to mankind as Hydrophobia; but to agriculturists it possesses additional interest, because, in addition to the danger they personally incur, the losses they are liable to sustain among

their stock from the bites of rabid dogs are by no means insignificant at times, in localities where the scourge prevails.

Pasteur, busy in his laboratory investigating different diseases of the human species—Typhoid Fever, a serious bone disorder, boils, Puerperal Fever in woman—in all of which he found special organisms, whose action he endeavoured to annul, applied himself more especially to the study of Hydrophobia, which, for a long time, had occupied his mind. He had been particularly struck by the peculiar view entertained by many physicians, and others, that this fatal disease was largely, if not altogether, due to mental excitement, and that contagion had little, if anything, to do with it. Of course, these physicians were not acquainted with veterinary medicine, and had no experience of Rabies in animals, else their imagination could not have so misled them. An opportunity occurred for him to collect some of the mucus from the throat of a child a few hours dead from the malady. With this he inoculated some rabbits beneath the skin, and they died in thirty-six hours; their saliva conveyed the disorder to other rabbits. There was nothing at all novel in this, as rabbits had been infected through experimental inoculation years before. But death had been so rapid in Pasteur's rabbits, that there was no time for them to have had the disease. More rabbits were inoculated, and in the blood and tissues of those dying and dead he found a special microbe, which was easily cultivated in sterile infusions, and produced death in other rabbits, re-appearing in them. This organism was also discovered in the saliva of children suffering from other maladies, and was not, therefore, special to Hydrophobia. Grown in successive cultivations at twelve hours' interval, its virulence remained undiminished; but if allowed to remain longer in contact with the air it became enfeebled, and attenuated cultures could thus be obtained; these inoculated in other rabbits were found to prevent the action of the strong virus. Though both ærobic and anærobic, the air destroyed its potency very quickly; but kept from the air, it retained its deadly character for months. It is much to be regretted that Pasteur has not stated whether he tried dogs with this microbe, as its discovery, it must be acknowledged, did not advance the question as to the exact cause of Rabies.

The incubation of Rabies is so uncertain, and sometimes so protracted, when produced in the ordinary way, that Pasteur became tired of waiting for months for the results of his inoculations, and therefore sought a more certain and rapid means of developing it. At length he could make it appear by introducing portions of the brain and spinal cord of dead rabid animals beneath the skin of dogs and rabbits, and this nervous matter could be kept in a state of purity for a long time, whereas rabific saliva was always impure, and lost its potency in twenty-four hours.

A happy thought induced Pasteur to place this pure nerve-virus on the surface of the brain of a dog, by trephining its skull while it was under the influence of chloroform, and it became rabid in a few days. Other dogs were treated in the same way, and nearly all yielded to the malady in less than twenty days. This showed that in the nerve substance the poison of rabies exists in its most concentrated form, and especially in the brain and upper part of the spinal cord (medulla oblongata)—the microbe of the disease evidently flourishing there most luxuriantly, though the virus is also localised in certain salivary glands and mucous surfaces, all of which peculiarities may account for differences in symptoms in cases of Hydrophobia. It was ascertained that the disease could be developed in an animal by passing infected brain-matter into its blood, through a vein, almost as quickly as by trephining.

For a number of years, in this country and on the Continent, by means of the microscope, extremely minute round bodies have been noticed in and

around the upper part of the spinal cord and brain of people and animals dead from the disease; these were also observed in Pasteur's laboratory, and it is not at all improbable that they are the germs of Rabies.

When the virus was passed through a certain series of monkeys it gradually lost its power, until it was so enfeebled that dogs inoculated with it did not suffer from Rabies, but were, on the contrary, rendered insusceptible to rabific inoculation. By such means Pasteur succeeded in rendering some sixteen out of every twenty dogs he inoculated refractory to Rabies. But remarkable and important though this result might be considered, he became impatient at having to wait for months before he could assure himself that such animals were really rendered proof. He therefore set about to find a method by which he could produce viruses of different degrees of strength, so that he might obtain more certain, more prompt, and more practical results.

This he at last effected by inoculating a rabbit on the brain with a portion of the spinal marrow of a rabid dog—this caused the disease to appear in about fifteen days. The virus was passed on to a second rabbit in the same way, and from this through a number—twenty to twenty-five—when the interval of latency was reduced to seven days. This happened with the greatest regularity in the experiments; and though the inoculations from rabbit to rabbit were carried up to ninety, the incubation period could not be reduced much below seven days. It may be mentioned that the experiments were carried on for more than three years without interruption, and without having recourse to any other virus than that of the successively infected rabbits.

Consequently, nothing was easier than to have constantly on hand a supply of rabific virus, perfectly pure, and always of the same quality or potency; and this was the practical feature of this long and laborious inquiry into the method of inoculation. The spinal cord of these rabbits was equally virulent throughout its whole extent, and if slices from it were removed, with all precautions to maintain their purity and freedom from putrefactive germs, and suspended in dry air in flasks (air dried by placing fragments of caustic potass at the bottom of the vessels), their virulence slowly disappeared until it vanished altogether—the rate of disappearance depending upon the thickness of the slice, each spinal cord being cut up into fourteen or fifteen pieces. Temperature also influenced its disappearance; as the lower this was, so the longer was the virulence maintained. If kept in carbonic acid gas, in a humid condition, air being excluded and no foreign microbes admitted, the pieces of nerve-tissue would remain potent for at least several months. These results constitute the scientific feature of the method.

When it was desired to render a dog refractory to Rabies in a relatively brief period, a fragment of fresh rabific spinal cord from a rabbit dead seven days after inoculation, was suspended every day in a series of flasks, the air in which was dried in the manner above mentioned. Every day also the dog was inoculated beneath the skin with a morsel of this dried spinal cord mixed up in a little sterilised broth—commencing with the oldest fragment, to make sure that it was not too virulent; each day a more recent fragment (an interval of two days' drying between each piece), until the last was reached, and which was very virulent, being only one or two days in the flask. After this the animal could be inoculated beneath the skin or on the surface of the brain with the most active virus, and Rabies would not follow.

Pasteur had inoculated fifty dogs of all ages and breeds, and rendered every one of them proof against the disease, when, unexpectedly, on July 6th, 1885, three individuals from Alsace arrived at his laboratory; two of them brought a boy nine years old, said to have been worried by a rabid dog on the 4th of that month, and the wounds, fourteen in number, gave evidence of this. Two professors of medicine saw the boy on the same day

as Pasteur, and from the history of the case and the nature of the injuries, it was considered a desperate one—death from Hydrophobia appearing inevitable.

Pasteur therefore decided, though not, it may be imagined, without grave misgivings, to practise on this child the method of protection which had invariably succeeded with dogs, even *after* they had been bitten by rabid ones. The step was a terribly venturesome one, and nothing but the apparently hopeless position of the patient, and the confidence in his method begotten by uniform success, could have endowed him with courage, or inspired him with hope, in undertaking by far the most formidable and most anxious task of his lifetime.

The disease is horribly agonising and dreadful—more so, perhaps, than any other which afflicts humanity; and while Pasteur was naturally anxious to save the boy from it, the risk was fearfully great that the very means employed to do this might produce it.

On the evening of July 6th—sixty hours after he was wounded—the boy received the first subcutaneous injection of spinal marrow, obtained from a rabid rabbit fifteen days before, and kept since then in a flask of dry air. The following days' inoculations were made in the same region—beneath the skin of the abdomen; so that thirteen inoculations were given in ten days, though Pasteur believed that a less number would have sufficed. The pieces of spinal cord had been dried from fourteen days to one day; and inoculations on trephined rabbits, made at the same time, showed that the five oldest specimens were not virulent, because they would not induce Rabies; while the five subsequently dried ones were all active, their virulence being proportionally greater as they were more recent, until the last killed in seven days. During the latter days, therefore, the child had received, successively, quantities of rabific matter, the last of which was so deadly as to destroy rabbits in seven days and dogs in ten—matter more virulent even than the poison of the rabid dog, because it had become intensified in its passage through the long series of rabbits.

This extreme virulence, though it might give rise to the gravest apprehensions, so far as the safety of the unfortunate child was concerned, yet had the advantage of limiting the duration of these apprehensions; as if it produced the disease at all, it must do so sooner than the ordinary dog virus would. But up to the time of writing this paper, the child remains unharmed—a living testimony to one of the most wonderful and valuable discoveries in medicine of this age, or perhaps of any time: a discovery vastly greater than Jenner's vaccination, great as that was.

Commencing with the discovery and the mastery over the microbes which destroy the stability of simple organic compounds and cause fermentation, by consistent reasoning, persistent experimentation, and profound—almost instinctive—powers of discernment, Pasteur advanced step by step along the same path, until he controlled, we may say vanquished, that form of fermentation, also due to micro-organisms, which destroys the life of man and beast. The most intense virus introduced into the body, either naturally or experimentally, had no power whatever for mischief after his protective inoculations; indeed, it seemed rather to consolidate and confirm the refractory condition with which these inoculations had endowed the individuals so protected.

It may well be imagined that Pasteur's boldness in venturing from animals to mankind, in his attacks upon disease, startled the medical world and the public more than anything he had yet attempted, and this all the more when the malady he dared to grapple with was Hydrophobia—the mere mention of which seems to conjure up feelings of dread and panic. By many, the successful issue of the inoculations which the first patient had undergone, and that of the large number of people submitted to them subsequently, was

received as a sure guarantee of immunity, even after several days had elapsed since injury was inflicted by rabid dogs. For Pasteur had proclaimed that, though a certain number of days (thirty) might have transpired after a person had presumably received infection from a mad dog, yet his attenuated virus, administered in the way described, anticipated the action of the slower-operating poison, and neutralised it. But in dealing with this, the most uncertain and hitherto intractable of all maladies, it was perfectly reasonable that many who were not at all prejudiced against the wizard of the Rue d'Ulm, but were, on the contrary, his enthusiastic admirers, should hesitate before accepting this latest and grandest conquest as absolutely demonstrative of his power over such a disease. The oftentimes very protracted period of latency or incubation, and the uncertainty of inoculation from rabid dog-bites —only a comparatively small proportion of those wounded suffering subsequently—caused many who knew the disease to withhold their applause until they saw whether the results of the experiments on animals could be applied to man with the same certainty and safety. But so far as matters have progressed up to the present time, there is every reason to believe that the most sceptical will soon have reason to acknowledge the genuineness of this splendid triumph in prophylactic medicine.

On March 1st of this year, Pasteur announced to the Academy of Sciences that he had inoculated no fewer than 358 persons, many of whom had been bitten by really rabid dogs, and the others by dogs suspectedly rabid.* Of these people, 100 were bitten before December 15, and the remainder subsequently; yet all, except one, had remained in good health, even the operation of inoculation being unaccompanied by any inconvenience. The case which died was that of a child severely bitten by a rabid sheep-dog on October 3rd, but who was not brought to Pasteur until thirty-seven days afterwards, when inoculation was practised, though against Pasteur's inclination, as he only too correctly surmised that the delay was too protracted. The child died of Hydrophobia. The inoculated persons have come from all parts of Europe, and some from America.

It is now proposed to establish a Pasteur Institute in Paris, for the reception of people who have been bitten by rabid animals, where they will be protectively inoculated against the disease.

It is difficult to arrive at a satisfactory interpretation of the method by which Pasteur renders animals and mankind impregnable to the infection of Rabies. He is himself of opinion that the facts are not in accord with the notion that contact with dry air gradually diminishes the intensity of the virus in the spinal marrow until it becomes null; so that the method is based on the employment of a virus at first almost inert, and then increasing in potency. The lengthened duration of the latent stage is not due to enfeeblement of the intensity of the virus, but to its diminution in quantity. So that the immunity might be given by inoculating very small, but daily increasing, doses of the same very active poison.

Another explanation he gives, which appears rather strange, but which agrees with certain results observed in studying micro-organisms, and especially the pathogenic, or disease-producing, microbes. Many of these appear to produce, in their cultivating media, matters which possess the property of hindering their own development. Since 1880, Pasteur had been making researces with the view to establish the fact that the Fowl-cholera microbe produces its own poison. He has not yet been able to demonstrate the presence of this matter, but he thinks this can be done by using pure carbonic acid gas. The microbe of Swine-plague is cultivable in very diverse kinds of infusions, but its increase in weight is so small, and it is so promptly

* It is perhaps needless to add that the list of patients sent to Mons. Pasteur increases day by day.—ED.

arrested in its proportion, that it does seem that something is elaborated which stops the growth of the organism, whether cultivated in air or in a vacuum. Professor Raulin, in 1870, announced that the mould—*Aspergillus niger*, when vegetating, develops a substance which partially checks its growth, should the nutritive medium not contain iron salts. It may be, therefore, that the rabific virus contains two distinct substances—one being living and capable of multiplying in the nervous system; and the other, non-vital, having the faculty, when in certain proportion, of interrupting the development of the first.

Thus far have I attempted to trace, though feebly, I fear, the progress made by Pasteur, in his noble endeavour to benefit mankind, by devoting his body and mind incessantly to the study of part of a sub-section of the organic world, consisting of organisms which, if infinitely mean in their dimensions, are yet amazingly powerful in their action, and of which little, if anything, was known before his advent. The record of his labours, and the success attending them, should be sufficient to stamp him as one of the great benefactors of the human race—his last achievement as far transcending his previous victories as his whole work must raise him above those whose one or two discoveries have conferred immortality upon them. Though quietly and unostentatiously toiling for so many years, without seeking for fame or reward, overtaxing health and strength, and incurring grave risks from infection from the poisons which he sought to render tractable and useful, as well as encountering disparagement, incredulity, and opposition, he has nevertheless risen to the highest pinnacle of greatness, and France has generously acknowledged how much he has added to her honour and well-being.

Professor Huxley, some time ago, in alluding to the benefits which have resulted from his labours, and pointing out the manner in which he has opened out such sources of wealth to industry and agriculture in his own country alone, has said: "Pasteur's discoveries suffice, of themselves, to cover the indemnity of five milliards of francs paid by France to Germany." But his discoveries in contagious diseases and their prevention, cannot be estimated at a money value; nor can the effect of these discoveries on present and future investigators be overlooked. The possibilities which his researches have thrown open, to my mind, are amazing, and have surprised Pasteur himself.

His discoveries he looked upon as only a mere begining, and he has often said: "You will see how all this will grow in time. Would that my life were longer." And all the friends of science and humanity must heartily echo the wish.

Some may be inclined to ask what practical value Pasteur's "Vaccination" is likely to have in dealing with contagious diseases; and others may deny that the method will ever possess advantages over the ordinary method of combating them. This question of practical utility is worthy of consideration, and until his vaccination has been tried extensively for some time, it would be somewhat imprudent to hazard an opinion one way or the other. We have no evidence, that, in the enfeebling or attenuating of the virus of these disorders, the germs are positively destroyed, On the contrary, we know that they are sufficiently active to remove from the blood and tissues the pabulum which would serve for the multiplication of another generation of their kind, or produce in the body they invade the hypothetical inhibitory substance which will act as a poison to them. And we know also that weakened germs can regain their pristine virulency, when placed in favourable conditions. Better by far, then, to utterly destroy the germs, even should this necessitate the destruction of the animals whose bodies they have taken possession for their breeding-ground, than to keep them alive in a semi-latent condition, from which they may start with all their lethal vigour, whenever circumstances allow them.

The apparently barbarous and unscientific "stamping-out" process has this to commend it, that, if thoroughly carried through, it exterminates the germs, as pulling up and burning noxious weeds before they seed clears the land of them. Therefore, in special cases, as where the disease is not very widely spread, and can be eardicated in this way without heavy loss, "stamping-out" by slaughter —repulsive though it must always be—must be preferable to protective inoculation. But it is evident that such a summary method can never be attempted with mankind; and even with animals, under certain conditions, it would be futile. Take such a malarious malady as the South African Horse-sickness, for example, which is indigenous to the *Vleys*, or low-lying valleys, and is due to germs in the water or on the moist herbage, which horses eat at a certain season. Such a disorder cannot be extinguished by destroying the sick horses, as the germs infest the soil, the grass the water, and, perhaps, the very air is laden with them at certain hours during the sickly period of the year. And so with other animal disorders of a contagious character, which are widespread, and so treacherous in their infectiveness, and insidious in their progress, that the skill and vigilance of man cannot grapple with them. For these the benefits of protective inoculation may be invoked.

Daily, the disciples of Pasteur enlarge the territory in which he was the first to break ground, and reap such a marvellous harvest; and the special microbe of each specific disease of man and beast is being revealed, and in some instances cultivated, so as to serve as a defence against its uncultivated congener.

One of the most treacherous and invasive, as well as destructive diseases of cattle, which is sapping the vitality of the best breeds, and which is communicable from the bovine to some other species—most probably, also, to mankind—through consuming infective milk and flesh, is Tuberculosis, or "Consumption." The microbe, or bacillus, of this infectious scourge was first clearly demonstrated by Koch, though previously Toussaint had found a micro-organism somewhat unlike this, but which may have been another form of the bacillus. He also succeded in producing a culture fluid, which, when inoculated, caused the disease. Gerlach, of the Berlin Veterinary School, had also, before this, proved the ready transmissibility of Tuberculosis, being corroborated by Toussaint, Chauveau, and others. But, unfortunately, this bacillus has not yet been made subservient to man in affording protection from consumption.

The bacillus of Glanders has been discovered and cultivated by Schutz and Löffler, but it does not yet ensure protection from that malignant pest of horses.

Micro-organisms (micrococci) were observed in Cattle-plague by Klebs, in 1872 and by Semmer, of the Dorpat Veterinary School, two years later. In 1882, the latter cultivated this microbe, and found it grew abundantly. A calf inoculated with the culture died in seven days from Rinderpest. When transferred the cultures gradually become weaker, and sheep inoculated with them did not perish, but were rendered refractory to infection. Semmer has also discovered the microbe of dog distemper.

Lustig, of the Hanover School, has discovered a bacillus in Horse influenza, which he has grown and inoculated. The same authority has also described, and experimented with, the organism of Lung-plague, which had already been discovered by two professors at Louvain University. Not long ago, the Agricultural Society of Pavia, alarmed by the havoc wrought by the Foot-and-mouth disease, appointed a committee to study its progress and nature. The Secretary was Dr. Nosotti, who verified the observation of the veterinary professor, Rivolta, that the disorder was due to a microbe—the *Micrococcus aphtosus*—inoculation of which always gave rise to the disease, which could be rendered benignant by the cultivation of the germ. And still more recently, Dr. Klein has published a short paper on this organism. On feeding sheep

with the twentieth-generation cultivation, he produced the disease in them.

I might further allude to similar discoveries, but this reference will testify to the immense impetus Pasteur has given to the study of these so-called "germs," —a study which has become so important as to constitute a section of biology, under the designation of Bacteriology.

There can be no doubt that the more we are acquainted with the nature, mode of development, vitality, and special peculiarities of these microscopic entities, the better shall we be able to destroy them, utilise them, resist their lethal influence, or avoid them. When we know, for instance, that septic germs are, in all probability, the active agents in the production of "Navel ill" in lambs, "Joint-ill" in foals, and "Heaves" (inflammation of the womb) in ewes, we can readily imagine how these serious conditions may be prevented by the exercise of a little care. One cause of abortion in cows is, with great likelihood, laid to the charge of germs; and the so-called Blood-poisoning, which so often follows surgical operations, injuries, and parturition (Puerperal or Parturient fever), is due to the malevolent living atoms, which seem to be omnipresent, and are ever eager to commence their natural course of proliferation. To the surgeon, to the veterinary surgeon, and also to the agriculturist who breeds, rears, or employs animals, this knowledge is of great moment. To the latter, also, it is of additional importance, seeing that the germs play a lively *rôle* in the dairy, in ensilage, in nitrification of soils, in the improvement or deterioration of food for animals, and in many other ways, which, until Pasteur began to throw light on them, were never suspected.

Errors are almost inevitable in such a study as this, of Bacteriology, which is so difficult and intricate, and demands an excess of patience and powers of observation that are given to few. For it must be remembered that each of these micro-organisms has a clearly-defined part to play in the programme of Nature; each has a chemical and distinct individuality, though in some instances it may be within a narrow compass, and though the differential anatomical or structural peculiarities of each may be most difficult, if not impossible, in some cases, to find out. They each have their affinities or predilections for nutriment, locality—whether in or out of the body—and their special mode of finding acces to a suitable *habitat*, and development there. Only with the most laborious care and special management and processes can some of them be rendered visible.

We may therefore conceive something of the magnitude of the task which investigators in this wide and only partially-explored region have to encounter, especially when we learn that as many as 50,000 of some of these bodies would be required to make up the bulk of one small cheese-mite. To have accomplished so much and so thoroughly in this direction; to have been the pioneer in investigations which have already revolutionised medical doctrine, and greatly added to our knowledge of natural phenomena; to have effected large economies in important industries and agricultural operations; but, above all, to have given us the means of averting or resisting the most baneful and pestilent diseases, is the honour to which Pasteur is entitled, and which will be gratefully accorded him now, and in still larger measure hereafter.

BANQUET TO THE COUNCIL OF THE ROYAL COLLEGE OF VETERINARY SURGEONS.

AFTER the Council meeting, on January 5th, the Worshipful the Mayor of Windsor, H. L. Simpson, Esq., F.R.C.V.S., J.P., entertained the members at an excellent banquet in the First Avenue Hotel. Nearly all the Council were present.

FIRST REPORT OF THE PATHO-BACTERIOLOGICAL EXPERIMENT-STATION FOR CONTAGIO-INFECTIOUS ANIMAL DISEASES OF THE STATE UNIVERSITY OF NEBRASKA, U.S.A. (FRANK S. BILLINGS, D.V.M., DIRECTOR.)

BY THOMAS BOWHILL, M.R.C.V.S., ASSISTANT.*

DR. BILLINGS came to Nebraska in the middle of April last, in order to do some original work on the American Swine-plague, the regents of the State university having kindly offered to give him such assistance as they could: their appropriation being almost exhausted, they had but little funds to offer. On account of this they had previously made application to the Commissioner of Agriculture at Washington to have Dr. Billings sent to Nebraska under the auspices of the "Bureau of Animal Industry," but their request was denied, although supported by the entire Nebraska delegation in congress and other representatives. The regents then offered to place the same funds offered the bureau at the disposal of Dr. Billings for the purpose above indicated, with such other conveniences for work as they could command. When the bureau's refusal became known Dr. Billings offered to come to Nebraska and place himself and his laboratory at the disposal of the regents, and to supply such additional means towards the expenses of the investigations as he could command, they to place such funds as they had at his disposal, as well as conveniences for his experiments.

Dr. Billings has a very fine laboratory, which, with his library, is worth about 10,000 dollars, and he has already spent about 1,000 dollars of his own money on additional instruments and other things necessary for the work. The laboratory is situated in one of the university-rooms, the experimental station for animals at the State farm, and comprises a neat house for autopsies and numerous isolated pig-pens. The doctor is about to fit up a room in the basement of the university for rabbits, guinea-pigs, and other small animals for use during the winter. Next spring it is expected that one of the finest experiment-stations in the world will be built for him with brick buildings.

The Swine-plague has not been so prevalent, or so severe in Nebraska during the past summer or fall as during preceding years. The doctor thinks that the severe weather of last winter, and the extremely wet, cold spring and early summer, must have exerted some mitigating influence on the virulent activity of the micro-organism of Swine-plague. Dr. Holcomb, of Kansas, reports the same favourable condition with regard to Swine-plague in that state. On account of lack of funds the doctor has been largely limited in his work to outbreaks in the vicinity of Lincoln, although he has made several trips of 100 miles or more into different parts of the state. The first case of swine plague that came under his notice occurred in swine belonging to Mr. W——, who lives about nine miles west of Lincoln. He had but few cases, and these took a slow and chronic course. The doctor killed one of the animals, and on making an autopsy found the characteristic lesions of Swine-plague. The spleen was at once removed and placed in a sterilized bottle and taken home, and numerous agar. agar. tubes inoculated, in each of which developed one form of micro-organismal life. As soon as possible a number of hogs were inoculated with these cultures, each of which died in the course of eight to fifteen days with unmistakable lesions of the disease. Cultivations from the spleen of these animals gave the same micro-organism as was found in the first instance. They were also found in the tissue of the intestine and other organs, and have since been found in every case of Swine-plague that has come under our notice.

Since I have been with the doctor, and after I had become acquainted

* Read before the annual meeting of the Illinois State Veterinary Association, Chicago, Ill., Nov. 11, 1886.

with the method of staining micro-organisms, I have done most of this work that has been done in the laboratory, and I have succeeded in demonstrating the presence of the micro-organism in effusions in the abdominal and thoracic cavities in the blood in the spleen, kidneys, liver, and lungs. This organ is oval in shape and very minute, requiring a one-twentieth of an inch oil-immersion lens to demonstrate it properly. It appears to correspond, in its morphological and staining characteristics as well as in various biological phenomena (that is, in its growth on agar. agar. or gelatine and on potatoes) to the one discovered and described by Prof. Schutz, the accomplished pathologist of the Berlin veterinary school, though there are several clinical, experimental and microscopical points of differentiation in the disease, which makes us inclined to doubt that the two micro-organisms are etiologically identical; that described by Schutz seems to be more virulent than the one we have been working with in Nebraska during the past year; this may perhaps be due to the afore-mentioned mitigating causes, and remains to be determined hereafter. On the other hand Schutz claims that the German Swine-plague is an "Infectious pneumonia," and does not mention, in the few autopsies which he reports, the ulcerated condition of the large intestine especially, and the peculiar circumscribed indurations which are so frequently met with in American hogs.

In the majority of our cases, and especially in very acute or severe ones, a characteristic autopsy of which will soon follow, the microscopical phenomena most certainly justify Dr. Klein's conclusion that the disease in American, as in English hogs, is a "pneumo-enteritis," though both in infection, under natural or experimental conditions, we meet with cases in which the lesions are limited more expressly to one than to the other of these complications. This micro-organism, as aforesaid, is an oval body, and hence, according to Koch, a bacterium. Koch classifies the pathogenic bacteriæ into (a) bacilli or rods, (b) cocci or round bodies, (c) bacteriæ or oval bodies—this bacteria colours best in methyl violet, though also with gentian violet, methylen green, and fuchsin, but not so satisfactorily. Its protoplasm seems to be differentiated into two chemically different substances; for, when not allowed to remain too long in the colouring fluid, the poles, or ends of the bacteria, assume a dark colour, separated by an uncoloured band of substance; the coloured plasma extends along the peripheries of the organism in a fine line uniting at the poles. This exactly corresponds to the description given by Prof. Schutz (see the report of the Imperial Board of Health of Germany, 1886, page 381), who says: "If the bacteria are coloured in a solution of gentian violet they show in their central part an uncoloured space surrounded by a blue coloured line; the quantity of this coloured mass is greater at the poles, so that the ends appear more strongly coloured; they appear of a homogeneous blue, when intensely coloured."

(*To be continued.*)

DISGRACEFUL CONDUCT OF VETERINARY STUDENTS.

It is reported that the students of the Dick Veterinary College behaved themselves in a most disgraceful manner on two evenings during the recent examinations of the Royal College of Veterinary Surgeons in Edinburgh. Their animus was chiefly directed towards one member of the Examining Board, whom they mobbed, insulted, and assaulted in the public streets, though other examiners, who happened to be accompanying him, shared (accidentally, we presume) in the attacks. Scarcely less disgraceful were the

proceedings in the theatre of the College a few days afterwards, at a meeting of these students, with a young teacher in the chair. It is probable that the affair will be brought before the Council of the Royal College at its next sitting, with a view to prevent a recurrence of such degrading performances, and to make an example of the ill-mannered individuals who, in this way at least, showed their unfitness for admission to the profession.

Proceedings of Veterinary Medical Societies, &c.

ROYAL COLLEGE OF VETERINARY SURGEONS.

Quarterly Meeting of Council, held January 5th, 1887.

Dr. G. Fleming, President, in the chair.

Present.—Professors Axe, Brown, Pritchard, Robertson; Messrs. Barford, Campbell, Carter, Cartledge, J. Roalfe Cox, Dray, Duguid, Fleming, Greaves, Mulvey, Perrins, Simcocks, Simpson (Windsor), Simpson (Maidenhead, Taylor, Whittle, Woods, Wragg, and the Secretary.

The Secretary read the notice convening the meeting.

The minutes of the previous meeting were read and confirmed.

Letters were read from Sir F. Fitzwygram, Professors Walley, Williams, and McCall, and Messrs. Hartley, Storrar, and Santy, regretting their inability to attend the meeting of Council.

The following presentations to the library were announced:—"Diseases and Disorders of the Horse," "Equine Hospital Prescriber," and "Veterinary Pharmacopæia," by the Messrs. Gresswell; "Calendar of the Royal College of Surgeons of England;" "Report on Swine Fever," by Professor Brown; "Remarks on Infection and Cattle Plague, etc.," by an "Octogenarian Baronet;" "Journal of the Royal Microscopical Society;" and a work on the "Source of Disease," by Pasquale Saitt.

On the motion of Professor Robertson, seconded by Mr. Dray, the thanks of the Council were accorded to the respective donors.

The diploma in favour of Mr. McOnie, a holder of Highland and Agricultural Society's certificate, was then signed.

Letters were read from the Messrs. Gamgee, thanking the Council for the letters of condolence; and from Mr. W. E. Salmon, of Washington, thanking the Council for his election as Honorary Associate.

Re County Court Fees.

Letter read from the Treasury Office, in reply to communication from the Council, on the subject of allowances to witnesses in County Courts, stating that when a revision of the scale took place the objection raised to the present scale would be fully considered. The Secretary was instructed to inquire when such revision was likely to take place.

Letter read from Signor Arévalo, holding certain diplomas, inquiring if he could be exempted from the first and second years of study.

The Secretary was directed to reply that the diplomas mentioned were not sufficient, and that he must go through the whole course of study, as required by the Bye-laws.

Letter read from Professor Robertson, asking to be furnished with a copy of the examination record sheets as formerly.

Professor Robertson said it had been the custom of the Examining Board to furnish the Principals of the schools with a duplicate copy of the examination records, so that he might see where the students had failed, the object being that if the teaching were weak in any given point it might be amended.

At the last Midsummer and Christmas Examination he had received no record, but simply the names of the men who had passed. He had therefore written to the Secretary, asking the Council to authorise him to furnish the Principal of the school with a copy of the examination sheets.

The PRESIDENT said he was not aware of the objection having been made by the Examining Boards to furnish the schools with copies of the examination sheets, but the Examiners had certainly objected to furnish the examination sheets every night, for the simple reason that the students coming up the following day knew the results of the previous evening's examination, and that very often put them in a state of great trepidation. It was therefore decided by the Examiners to let the schools have a copy of the results at the end of the examinations. He was not aware that that arrangement had been departed from, but judging from experience, he thought it would be very injudicious to post the list every evening, unless the Principals of the schools would keep it confidential until the examinations were finished. It was also found in the last Final Examination that students who knew the subjects upon which they had been rejected studied those only, ignoring those in which they had already passed. He thought the Principals should know, in order that the students might be better prepared in those subjects; but for the student himself to know and study only the subjects in which he had failed was not judicious. It was entirely in the hands of the Council; the Examining Board had adopted the course which they thought most beneficial to the students as well as to the schools themselves.

Mr. GREAVES thought there was nothing unreasonable in the desire expressed by Professor Robertson, and therefore moved that the information that he required should be furnished to him at the end of every class examination.

Mr. DRAY seconded the motion. The motion was agreed to.

Mr. H. L. SIMPSON, on behalf of the Royal Counties Veterinary and Medical Association, asked permission to place a memorial window in the Council room.

The PRESIDENT said he was sure they would receive this gift from the Association with great pleasure. It redounded very greatly to the credit of the Associations that they had come forward so liberally in the way of decorating their Council room.

Mr. WHITTLE moved that the desired permission be given.

Mr. PERRINS seconded the motion, which was agreed to.

Finance Committee.

On the motion of Mr. DRAY, seconded by Professor PRITCHARD, the Report of the Finance Committee was received, and cheques ordered to be drawn for current liabilities.

The SECRETARY stated that at a meeting of the Executive Committee, with reference to the Greaves Testimonial, it had been resolved: "That permission be asked from the Council to suspend a testimonial portrait of Thomas Greaves, Esq., in the Council chamber of the College, said portrait to be painted by Mr. Hudson, artist, Hull."

Mr. J. F. SIMPSON proposed that permission be given to the Greaves Testimonial Committee to suspend the portrait in that room.

Mr. WRAGG seconded the motion, which was agreed to.

The Building Fund.

Mr. DRAY stated that the debt still owing on the new building was about £1,600. He hoped, before shuffling off this mortal coil, to see the College out of debt, and thought that if a strenuous effort were made it could be accomplished.

The PRESIDENT said the Finance Committee had met that day, and, after seriously considering this matter, had resolved: "That in view of the heavy debt incurred in building the Royal College, and the unsatisfactory condition of the College Building Fund, the Finance Committee strongly urge upon the Council the necessity for adopting measures for the liquidation of this debt as speedily as possible." He thought a strong appeal should be made to the profession.

Mr. GREAVES said these matters were not helped by the bulk of the profession, but by the few. He had had the honour of doing a little towards liquidating this debt, and was willing to do a little more. He would therefore give another £20, if the members of Council would also assist in proportion to their means. He should also be very happy to provide a presidential chair for the Council, if they would accept it at his hands.

Professor ROBERTSON proposed that advertisements be inserted in the professional journals, calling the attention of the profession to the financial position of the Royal College with regard to its Building Fund, and urging the profession to subscribe, in order that the debt incurred might be liquidated.

Mr. WOOD seconded the motion, which was agreed to.

The Reports of the Registration Committee, the House Committee, and the Bye-laws Committee were read.

The Report of the Court of Examiners was read.

The Obituary List was read.

Mr. DRAY proposed that a letter of condolence and sympathy should be sent to Mrs. Martin Naylor, of Wakefield. He had known Mr. Martin Naylor for forty-four years, who was very much respected by the inhabitants of Wakefield and the neighbourhood, and was a very prominent member of the Yorkshire Veterinary Medical Society. He also proposed that a letter of condolence and sympathy be sent to the family of the late Mr. Cartwright, of Wolverhampton. Mr. Cartwright had been connected with the Council for a long time, and was their oldest Vice-President. He was much respected by the whole of the profession, and by his patron. He was a man of undeniable integrity, and was an ornament to the profession.

Mr. GREAVES seconded the resolution, which was agreed to.

The PRESIDENT proposed that a similar letter should be sent to the family of the late Mr. Jenkins, Secretary of the Royal Agricultural Society, by whose death the profession had lost a very warm and sincere friend.

Professor AXE seconded the motion, which was agreed to.

On the motion of Mr. DRAY, seconded by Mr. WOOD, Dr. Fleming was appointed a Trustee in the place of Mr. Cartwright.

The appointment of a new Vice-President was deferred until the next Council was formed.

On the motion of Mr. WHITTLE, seconded by Mr. SIMPSON, Messrs. Woodger and Broad were reappointed as Auditors, and the thanks of the Council were accorded to them for their past services.

Mr. H. L. SIMPSON (Mayor of Windsor) gave notice that he should propose at the next meeting of the Council that a congratulatory letter be sent to the Queen on the occasion of her Jubilee.

It was proposed by Mr. WOOD, seconded by Mr. DRAY, and agreed to, that the members of the Council be authorised to receive subscriptions for the College Fund.

SPECIAL MEETING.

The PRESIDENT explained that this meeting was for the purpose of receiving any notices as to alterations in the bye-laws which would be discussed at the next meeting.

Mr. GREAVES proposed, on behalf of the Registrar, the following resolu-

tion:—"That the Registrar is hereby authorised and instructed to add a postcript at the foot of the Annual List, which is sent out to every member of the professsion, as follows:—'The Registrar, being very anxious to correct all inaccuracies in the register, will feel obliged by each member assisting him and informing him of the correct address or death of any member now improperly upon the register, in his county or district.'"

The PRESIDENT proposed the following as an addition to bye-law 48:—"A candidate for the diploma of the Royal College of Veterinary Surgeons, who already holds the diploma of a recognised veterinary college, or college equal in value to that of the Royal College, shall be exempted from further study and be permitted to present himself directly for examination for the diploma."

Mr. P. TAYLOR moved that the bye-laws, with the proposed alterations, be submitted to their legal adviser, for comparison with the Charters and Act of Parliament.

Mr. WOODS seconded the motion, which was agreed to.

A vote of thanks was then accorded to the President for his conduct in the chair, and the Council adjourned.

LANCASHIRE VETERINARY MEDICAL ASSOCIATION.

THE usual quarterly meeting was held at the Blackfriars Hotel, Manchester, December 8th, 1886.

Present: Thomas Briggs, Esq. (President), Messrs. P. Taylor, Thomas Greaves, W. Whittle, J. Lawson, W. A. Taylor, T. Hopkin, T. Leather, A. Leather, J. Bridge, S. Locke, R. Herbert, A. Lawson, J. B. Wolstenholme, W. Woods, jun., G. Ellison, T. E. Horrocks, H. Ferguson, and J. W. Ingram.

Visitors: Dr. Wolstenholme, Messrs. R. C. Edwards and J. Moore.

Read circular convening meeting.

Minutes of the last meeting were read and confirmed.

Letters of excuse for non-attendance were received from Professor Williams, Messrs. E. Faulkner, J. W. T. Moore, James Marshall, and J. S. Hurndall.

Letters from Mr. E. Faulkner and Mr. J. S. Hurndall were read, saying that, under the circumstances, they had much pleasure in withdrawing their resignations.

Mr. W. A. TAYLOR nominated Mr. A. B. Wren, M.R.C.V.S., Manchester, and Mr. J. Munro, M.R.C.V.S., Altrincham, as members of this Association.

Proposed by Mr. W. A. TAYLOR, seconded by Mr. GREAVES, that the best thanks of this Association be given to the office-bearers for the past year. Carried unanimously.

The TREASURER (Mr. W. Woods, jun.) then read his annual report, which in due course will be printed and circulated.

Resolved that the late Auditors, Mr. J. Lawson and Mr. T. Hopkin, be re-elected.

Mr. GREAVES proposed, seconded by Mr. T. HOPKIN, that Mr. T. Briggs be re-elected President for the ensuing year. Carried unanimously.

Mr. P. TAYLOR proposed, seconded by Mr. J. B. WOLSTENHOLME, that Mr. A. Leather be elected Secretary. Carried unanimously.

Mr. GREAVES proposed, seconded by Mr. P. TAYLOR, that Mr. W. Woods, jun., be re-elected Treasurer. Carried unanimously.

Mr. P. TAYLOR proposed, and Mr. WHITTLE seconded, the election of Messrs. S. Locke, J. B. Wolstenholme, and A. Darwell, as Vice-presidents. Carried unanimously.

Mr. J. B. WOLSTENHOLME then read a very interesting and carefully-compiled paper on

Rabies and Hydrophobia.

Mr. President and Gentlemen,—Responding to the request of our worthy Chairman that I should introduce a subject for discussion at this meeting, I have ventured upon that of Rabies and Hydrophobia.

In this subject centres at the present time a very vortex of interest alike to the general public, the surgeon, and the scientist.

Rabies and Hydrophobia, viewed from the standpoint of its mortality, need excite little attention, but, when considered with regard to the protracted and terrible anxiety which is experienced by those bitten by a rabid animal, and the agonising certain death which follows if the disease has been contracted, attention is arrested and interest is aroused, but this interest rises to the highest point when a cure is announced on good authority, and by a method which bids fair to revolutionise or to be an important factor in revolutionising all our preaccepted ideas of disease and its treatment.

Rabies and Hydrophobia have been recognised for centuries. Of the symptoms, I need only remark that in the dog there is no dread of water, nor any nervous paroxysms on seeing it, or in attempting to swallow the same.

In the dog also we recognise two varieties of Rabies, viz., furious and paralytic, or dumb Rabies; in the human subject one form only is seen, and that a modification of the furious description.

Of the treatment of Hydrophobia in the past, one is tempted to say that every means to prevent and cure had been tried, and proved futile; charms, incantations, and nostrums, methods of rational and irrational treatment, have been multiplied *ad infinitum;* the ignorant have quacked, and the learned have pondered, but no progress has been made.

From this point, gentlemen, I desire to draw your attention to the studies of M. Pasteur, who, commencing some 30 years ago, confirmed the observations of Dumas that fermentation was a process induced and maintained by the growth and development of a certain living organism.

His further researches have established the fact that all forms of fermentation and putrefaction are due to similar physiological phenomena.

His continued discoveries have placed him in the van of those who maintain that there is no life except from pre-existing life, whilst the masterly manner in which he has demonstrated that a minute vegetable organism is the cause of such devastating diseases as "Pebrine" and "Flacherie" in silkworms, Cholera in fowls, and Anthrax in cattle, has qualified him in the highest degree as an investigator of the specific nature of Rabies and Hydrophobia.

Pasteur's investigations have not terminated when the precise *cause* of a disease has been arrived at. No! Steadily following the line, making experiment after experiment, and verification in abundance, he has perfected a mode of inoculation which gives immunity from Fowl Cholera and Anthrax, and leads thoughtful men to consider that all the so-called specific diseases with incubative periods are due to the presence of similar minute organisms, and that it may be possible to modify or control these diseases by introducing into the economy either the obnoxious microbe itself, after it has been prepared by particular culture, or by introducing other microbes, which experiment has demonstrated as being antagonistic to, and destructive of, the former and disease-producing germs.

In the year 1880, Pasteur's position as a physiological and pathological savant was something as I have just attempted to sketch. In December of that year a child died of Hydrophobia in one of the Parisian hospitals; she had been previously bitten by a dog undoubtedly rabid. Shortly after death Pasteur took a little of the saliva from this child's mouth, and inoculated some rabbits with it; the rabbits died in about thirty-six hours afterwards. Other rabbits were inoculated from these, and others in succession were

inoculated, both by means of their saliva and blood; each series died in a shorter period than the one preceding it; but the symptoms exhibited were *not* those of Rabies.

Further investigation showed the presence in the blood of a microbe in the form of a figure of 8; this was also found in normal human saliva. However, cultivation of this organism in veal broth produced death in rabbits, and Pasteur considered it a new disease.

Continuing his experiments with rabid dogs and rabbits, Pasteur came to the conclusion that the poison did not exist in the blood, for it was found that Rabies did not follow when blood from a rabid animal had been injected into another.

After this Pasteur determined to seek for the virus in the nervous system, as suggested by M. Duboué in 1879. He commenced by inoculating with small portions of the medulla oblongata, frontal portion of the cerebral hemispheres, and with cerebro-spinal fluid, from animals which had died of Rabies; these inoculations resulted in death from Rabies in periods varying from eight to forty days. He also found that the transmission never failed when the inoculation was made beneath the dura-mater, and also he noticed that the period of inoculation was shorter when the poison was thus introduced.

In 1882 Pasteur announced to the Academy that he had by further experiment verified his previous conclusions, and he was of opinion that in inoculating with the saliva of a rabid animal death might ensue in one of three ways, viz.:—

1st. In a few hours by what, in 1880, he called a new disease, viz., that due to the proliferation of the diplococcus (figure of 8 microbe) in the blood and tissues.

2nd. From Pyæmia.

3rd. From Rabies.

Further experiments demonstrated that when nervous material from a rabid animal was injected beneath the dura-mater, or injected into the veins, each was equally certain to produce Rabies, and also with about the same period of incubation, but this difference was also observed, that when the inoculation was into the cranium, Rabies in the furious form usually resulted, whilst venous injection was generally followed by dumb Rabies.

In 1884 Pasteur announced that as a result of further observation he found that the rabific virus was present, not only in the saliva and central nervous organs, but also in the salivary glands and the peripheral nerves This latter fact was demonstrated, as I have read somewhere, by a French veterinary surgeon in 1803, who took a portion of the crural nerve from a rabid cat whilst alive, and with it inoculated a dog, which, in due course, died with Rabies.

These experiments further indicated that, irrespective of mode of introduction, the form of Rabies (furious or dumb) induced in the dog was due to the *amount* of poison injected, that furious Rabies succeeded a small quantity, and that Paralytic Rabies followed a large dose.

The next stage in these discoveries was the observation of the fact that when Rabies has been transmitted through a series of animals of the same species, the virus attains the property of reproducing Rabies in a very definite period, for, previous to this condition, being arrived at, the incubative period could not be calculated to nearer than two or three days, whilst now Pasteur is able to prognosticate the first appearance of the symptoms to within a few hours.

Continuing these researches through series of animals, not only was the property of *definiteness* still further verified, but it was found that in the case of guinea-pigs and rabbits, each successive inoculation rendered more virulent the produced virus, until a certain maximum was attained, at which

the standard of virulence was maintained so long as the same species of animal was the subject of experiment. On the other hand, it was found that the same virus, passed through a series of *monkeys*, became weaker and weaker until a strength was arrived at in which no symptoms of Rabies resulted where a dog was inoculated from a monkey. Again if this attenuated virus was repassed through a series of rabbits it was found to become gradually more and more virulent until the maximum was again attained.

The maximum of virulence thus obtained in the rabbit was found to be more powerful than the virus obtained from a rabid dog.

Again, as this virulence increases in its successive passage through rabbits, so also does the period of incubation become shorter and shorter, until at the condition of maximum strength, the minimum period of incubation is almost reached.

Thus, in the first rabbit (inoculated by means of cerebral tissue taken from a dog dead from Rabies, and introduced into the cranium of the rabbit), an average incubation period of fifteen days is obtained; but when a series of twenty to twenty-five rabbits in succession have been inoculated, the one from the other, the period of incubation is reduced to eight days, which is further shortened to seven days at about the fiftieth rabbit.

Now the question arose as to whether the virus obtained by passage through a series of monkeys, attenuated so as not to be able to produce Rabies in the dog, was possessed of an prophylactic property or not, and it was found that it was.

The method finally adopted was to inoculate a dog with this attenuated virus, and at the same time inoculate a rabbit; in due course the dog was reinoculated from this rabbit, and a second rabbit was inoculated, and so on through a series, reinoculating the dog with virus from each successive rabbit, until the condition of maximum strength of virus was obtained.

The dog remained apparently healthy, although he had been injected with a rabific virus which invariably produced Rabies and death in a dog which had not been thus led up to its tolerance.

A committee was appointed to investigate this prophylactic treatment, and they reported upon it in August, 1884.

Nineteen dogs were taken and submitted to the following tests, viz.:—

Six were bitten by rabid dogs—three died; eight were inoculated with rabid virus, from the nervous system, by injection into the veins—six died; five were inoculated under the dura mater—five died; all from Rabies.

Then twenty-three dogs which Pasteur had prepared were taken and submitted to similar tests; in twenty-two of them no ill effects followed, but one died—this was in all probability not from Rabies, as three rabbits and a guinea-pig were inoculated with cerebral matter from the dead dog, and no Rabies or other disease followed.

Many experiments were conducted with spinal cords of rabid animals, in order to see what change was effected in them. They were submitted to various conditions of temperature, were kept in vacuo, in carbonic anhydride, in dry and moist atmospheric air, etc., etc.

One effect ascertained was that when a portion of spinal cord, removed under antiseptic precautions from an animal dead from Rabies, and inserted into a jar of dry atmospheric air, and there maintained free from external microbic infection, it gradually lost its virulence, and that finally it became inert

A moderately warm temperature was found to accelerate this process, and a reduced temperature retarded it.

To test whether any prophylactic value was obtained by means of this new method of attenuation, a dog was inoculated, first, with a mixture of sterilised broth and a portion of spinal cord which had been suspended long enough to lose its rabific properties, as proved also by experiment (the

inoculation was made beneath the skin), then on each succeeding day the dog was reinoculated with broth and spinal cord which had been suspended for a period one day shorter than that used on the previous day; this was continued until the dog was inoculated with the most recent and most virulent nervous material. The dog did not become rabid, and afterwards withstood any test to which he was submitted.

In 1885 Pasteur had fifty dogs, which were in this manner rendered refractory to Rabies; he had not had a single failure.

Up to this point all the experiments were performed with the object of so preparing the system of the patient that when the most powerful rabific virus should be introduced, it would be proof against it, as a completely fermented liquid is proof against, or contains no pabulum for the growth of the same ferment; and also as in the case of vaccination, we observe a modifying or sterilising effect on the introduction of the Small-pox virus.

This prophylactic property is, of course, widely different from that of a remedy or specific for the cure of a disease. In the former a healthy organism is subjected to treatment, whilst in the latter case the disease in its ordinary mode of development is more or less established; yet, if we sought for a parallel, I think we might again cite vaccination for Small-pox, for I think that our medical confrères admit that vaccination subsequent to the infection of Small-pox exerts a modifying influence.

However, Pasteur, reflecting upon the long period of incubation in Rabies, succeeding the bite of a rabid animal, and the comparatively short space of time requisite to render refractory by the prophylactic method, imagined that possibly post-vaccinations might be efficacious.

This was the position of experimental research, and the attitude of Pasteur's mind when, on the 6th July, 1885, a child, Joseph Meister, arrived in Paris. This boy had been bitten in fourteen different places by an undoubtedly rabid dog, a dog which not only exhibited all the symptoms during life, but had the usual *post-mortem* conditions. Meister was inoculated beneath the skin with the mixture of sterilised broth, and a fragment of spinal cord attenuated to the point of inertness, by suspension in dry air. The inoculations were continued from spinal cords of increasing virulence in the manner, as described with respect to the dog; in all Meister was inoculated thirteen times in ten days.

From July, 1885, up to the end of October in this year, some 2,496 persons have been treated for Hydrophobia at the establishment of Pasteur. Of these, the great majority have come to him, accompanied by a certificate from a veterinary surgeon, or a surgeon, stating that the animal which had inflicted the wounds was at the time rabid. Of 1,700 French patients thus treated, only ten have died. On the other hand, of the small minority of cases in France not sent to M. Pasteur, there have been seventeen deaths from Hydrophobia in the same period of time.

The average number of deaths from this cause in the Parisian hospitals alone during the last five years, have been eleven per annum. Serious wounds about the face and head, especially when inflicted by wolves, seem to demand a more rapid and continued treatment than was instituted at the commencement, and to this end Pasteur has of late been directing his energies.

Gentlemen, in thus opening the discussion, I trust that, as the evening advances, further explanations of the process employed by M. Pasteur will be elicited. Indeed, until I heard from Dr. Dreschfeld last evening, I had hoped that we should have had the pleasure of a detailed account from that gentleman of the *modus operandi*, as he observed it last summer.

In conclusion, gentlemen, I beg to submit this paper to you as a slight expression of high admiration of the genius and untiring industry of the learned gentleman whose studies have formed its basis.

A long and interesting discussion followed, in which most of the members took part.

A vote of thanks to the essayist was proposed by Mr. P. TAYLOR and seconded by Mr. JOHN LAWSON, and embodied in this resolution was a request that Mr. Wolstenholme should acquaint Dr. Dreschfeld that it was the unanimous and earnest wish of the Association that he should at the next meeting, if convenient, kindly be present and give his experience and views of Rabies and Hydrophobia.

The PRESIDENT then introduced the subjects of which he had given notice, "The Anthrax Order of 1886 (No. 3,447)," and "The Rabies Order of 1886 (No. 3,448)"; of the Contagious Diseases (Animals) Act, as to—

(A) What constitutes "Anthrax" within the meaning of the order? and

(B) Under what circumstances will a veterinary surgeon's premises come under the Rabies Order.

A short discussion took place, and it was decided that the matter should be reopened, if occasion required.

The usual vote of thanks to the President concluded the meeting.

NORTH OF ENGLAND VETERINARY MEDICAL ASSOCIATION.

THE usual quarterly meeting of this association was held in the County Hotel, Newcastle-upon-Tyne, on Friday, November 26th, 1886, the president, Mr. J. B. Nesbit, F.R.C.V.S., in the chair.

Present: Messrs. D. Dudgeon, Sunderland; D. McGregor, Bedlington; G. Farrow, jun., Durham; J. Gofton, North Shields; H. Hunter; A. Hunter; J. W. T. Moore; W. A. Hancock, and G. Elphick, Newcastle-upon-Tyne. Owing to the indisposition of Mr. Gresty, Mr. Elphick officiated as secretary.

The minutes of the previous meeting were read and confirmed. Letters of apology, regretting their inability to attend the meeting, were read from Professors Robertson and Walley, Messrs. T. Foreman, T. Greaves, W. L. Briggs, J. E. Peele and W. J. Mulvey.

The SECRETARY then read a letter from Mr. M. Hedley, Dublin Castle, thanking the members of the association for their letter of condolence and sympathy, at the death of his uncle, Mr. M. Hedley, Darlington, which was ordered to be placed upon the minutes.

Mr. H. HUNTER, in very feeling terms of respect, moved a vote of condolence and sympathy to Mr. Clement Stephenson, on the death of his father, which was seconded by Mr. D. McGregor, supported by Mr. J. B. Nesbit, and carried unanimously.

Mr. F. R. Stevens was then unanimously elected a member of this association.

Mr. J. B. NESBIT nominated Mr. W. Stevenson, of Whitburn, for election as a member.

Mr. H. HUNTER proposed that this association ask the National Veterinary Association to hold their annual meeting of 1888 in Newcastle-upon-Tyne. Mr. D. McGregor said he had much pleasure in seconding Mr. Hunter's proposal, which was put to the meeting and carried unanimously.

The following gentlemen were then unanimously elected office-bearers for the ensuing year: president, Mr. D. Dudgeon, Sunderland; vice-presidents, Messrs. J. Gofton, North Shields, and H. Hunter, Newcastle-upon-Tyne; secretary and treasurer, Mr. A. Hunter, Newcastle-upon-Tyne; auditors, Messrs. Moore and Hancock.

Mr. J. B. NESBIT said he very much regretted the absence of Mr. Mulvey, owing to sickness in his family, aud he was sure the members sympathised with him in his affliction. He (Mr. Mulvey) intended reading a paper at this

meeting on Skin Diseases. He must apologise for Mr. Mulvey's absence, and also for himself as President, and trusted he (Mr. Mulvey) would be able to read the paper at some future meeting. He said: "Gentlemen, this being our last meeting, I beg to return you my sincere thanks for the honour you have done me by your kindly assistance during the time I have occupied the chair, and I assure you it has been one of very great pleasure."

Mr. H. HUNTER begged to propose a hearty vote of thanks to Mr. J. B. Nesbit as retiring President, which was seconded by Mr. J. GOFTON, supported by Mr. D. DUDGEON, etc., and carried by acclamation.

Mr. J. B. NESBIT briefly returned thanks.

Mr. J. W. T. MOORE proposed a hearty vote of thanks to Mr. Colin Gresty for the very able manner in which he had discharged his duties as Secretary and Treasurer during the two years he has held office. He (Mr. MOORE) was very sorry Mr. Gresty was not able to be present that day, and wished Mr. Elphick to convey their sincere thanks to him.

Mr. J. B. NESBIT said he had much pleasure in seconding the vote of thanks to Mr. Gresty. He (as President) had always found him very courteous and obliging, and thought that in a great measure the success of these meetings was due to his energies.

Mr. ELPHICK returned thanks on behalf of Mr. Gresty, and said he could endorse every word that had been said by Messrs. Moore and Nesbit.

A hearty vote of thanks to the Chairman brought the meeting to a close.

GEORGE ELPHICK, *Hon. Sec., pro tem.*

LINCOLNSHIRE VETERINARY MEDICAL SOCIETY.

THE quarterly meeting of this Society was held at the Bristol Arms Hotel, Sleaford, on Thursday, November 11th. The President (R. D. Hardy, Esq., of Sleaford) occupied the chair; and there were also present: Messrs. T. Smith (Market Rasen), Gresswell (Peterborough), J. Hoole (Sleaford), Gooch (Stamford), Wragg (London), Banham (Cambridge), Mackinder (Peterborough), Greaves (Manchester), T. H. Reeks (Spalding), C. Hartley (Lincoln), Secretary, Prof. Robertson, and Captain Russell (Grantham); and visitors—Messrs. Clark and Aitken.

Mr. Clark, of March, was proposed as a new member by Mr. HARTLEY, seconded by Mr. GRESSWELL, and carried.

Mr. ——'s name was also submitted, and carried.

The minutes having been taken as read, letters of apology for absence were read from Messrs. Brooks (Fulbeck), Santley (Norwich), Hall (Spilsby), Field (Grimsby), Freer (Uppingham), Howse (Lincoln), G. B. Gresswell (Louth), Sale (Edinburgh).

Captain RUSSELL proposed that a statement of accounts be attached to the fly-sheet of the circular for the next meeting.

Annual Meeting.

On the proposition of Mr. MACKINDER, seconded by Captain RUSSELL, it was carried that the annual meeting in January be held at Stamford.

An interesting discussion followed on approved instruments, in which the PRESIDENT, Captain RUSSELL, and Mr. HARTLEY took part.

Prof. ROBERTSON then read the following interesting paper:—

SOME OBSERVATIONS ON SPLINTS, SPAVINS, AND SIDEBONES, IN THEIR RELATION TO THE QUESTION OF SOUNDNESS IN HORSES.

The very mention of these terms smacks of what is peculiarly professional, and of horse-causes and litigations. I might certainly have chosen what would have been regarded as a more recondite and philosophical subject with which

to start the discussion to-day. After some little thought, however, aided by what your respected secretary informed me, I came to the conclusion that some subject of general and everyday practical interest, upon which all might be expected to have something to communicate, would better serve the purpose of our meeting than any, the importance of which depended chiefly upon some ill-understood point of *ætiology* or *pathology*. Not that I believe that, connected with the subject of "Splints, Spavins, and Sidebones," there is not room for difference of opinion and for the obtaining of more special and general information on their nature and causes of development, but rather because these are not their only points of interest to horse-owners and veterinarians. You are well aware, gentlemen, that in many cities and centres of our horse population the determining the question of soundness and the treatment of lameness constitute a large part of the veterinarian's work, and that upon the ability we possess of satisfactorily answering the former and of restoring lame animals to comparative soundness, in great measure depends the estimation in which we are held by a considerable section of the public. Probably, in the future, when education and intelligence are more extensively distributed, the value of the animal physician may be judged more by his ability to circumscribe than to cure disease. In the meantime, we cannot shut our eyes to the importance of diseases of the locomotory organs inducing lameness, as a section of our everyday work.

The diseases "*splints*" and "*spavins*" are probably as frequently in the mouths of horse-owners and veterinarians as aught else; while their existence and their relation to defective action are probably as fertile sources of litigation as most other ailments.

From the frequency with which these defects exist in the greater number of all varieties of our horses, any one pretending to general or special, common or professional knowledge of the animal would consider himself unjustly treated were doubts thrown upon his knowledge of the nature of these, the reason of their existence, the consequences which are linked to them, or the relation which they bear to the questions of soundness and unsoundness. Now, although not intending to deny that there exists in both classes of observers noticed a considerable amount of information in the form of facts—the most valuable method of acquiring information in this department of knowledge—I may yet be allowed to doubt that either class possess in all its fulness at any time the knowledge necessary to form a just estimate of the importance of these as related to the soundness and consequent value of the animals affected.

Knowing that in a society such as this there must necessarily exist a large amount of information of precisely the nature wanted, what remarks I propose now to make as introductory to a discussion of the subject will be rather of a suggestive and interrogative character than assertive—in short, more with a view of eliciting, than of giving, information.

What do we, at the present day, understand as "*splint*"? Are we to confine the term to that which in the days of our fathers it was stated to be, viz., a bony enlargement on the splint bones, *i.e.*, the small metacarpals; or a change from fibrous to bony material of the interconnecting ligamentous tissue existing between the large and small metacarpal bones of the horse; or do we accord to the term a more comprehensive significance, embracing all bony growths of whatever character occurring on the metacarpal bones chiefly, and to a less extent on the metatarsal? If this latter definition be accepted, we will find that in character it is needful to make some distinction between such as are more truly osseous tumours, and those which appear as the result of inflammatory action. To a certain extent we find that in practice such a distinction has been made, in the recognition of Splints which produce, and those which are unattended with lameness. I am certainly of

the opinion that the restriction of the term to simple ossific union of the small and large metacarpal bones, or to the existence of a bony growth on these alone, is inaccurate as expressing the belief of veterinarians of the present day. I do not deny that the change connected with the appearance of Splints does frequently start in this tissue. The fact that such a change regularly occurs in this ligamentous connection in a great number of horses at a comparatively early period of life without interfering with their action, has led not a few to regard this union as a normal condition.

Any one who has given more than a merely passing attention to the state of the bone and bony growths after death cannot have failed to observe that in their general and particular characters these latter are not invariably the same. One considerable section of these seems to partake of the character of local bone hypertrophy—true *osteoma*. In these the protuberance seems simply raised above the level of the bone on which it is situated by an upheaval in the substance of the shell of the bone, which in swelling has carried the firmer layer of compact tissue with it. A few of these possess an unusual density and sparse arrangement of open tissue. Another variety seems to owe their elevated condition to the outpouring of a plastic material outside and over the shell of the metacarpal, which deposit has afterwards become ossified; these latter are rarely of the ivory character which some of the former possess.

The former variety are more frequently seen in adult animals; they conform to the characters of true bone tumours; they are frequently unattended with lameness, and are disposed to disappear with age. The latter are commoner in the young; they are connected with inflammatory action in the bone on which they are situated or its covering membrane, and they are usually attended with lameness. The ideas at present attached to the term "*splint*" appear to me to imply the existence of a bony growth upon, and connected with, the cannon bones, chiefly those of the fore limbs, and in their nature inflammatory, or more or less inflammatory.

As my intention is not to give an exhaustive essay on Splints, Spavins, or Sidebones, I will spare you the wearisomeness of travelling over the consideration of the stereotyped divisions of ætiology, symptomatology, and treatment. I will merely direct your attention to a few interesting and salient points frequently overlooked in more methodical studies of these affections, and having a close relation to the question of the soundness of the horse when so.

Of the causes of Splints, I will simply say that they are probably both general and particular, the one class referring to something indwelling and inherent, closely related in some mysterious way to a near or distant ancestry; the other frequently appreciable and operating from without.

1. *Why do all Splints not cause Lameness?*—This is a question which, I believe, has received different answers. It is an interesting one, and deserves a little attention. By many, the mere situation, or part of the bone with which they are connected, is believed to have much to do with their effect on locomotion. Most of us associated with horses are accustomed to hear, and probably also remark, as to the favourable or unfavourable position of the growth. I sometimes wonder if we have ever asked ourselves to consider how far the matter of simple position has an effect in producing lameness. As to the question of the Splint interfering with the action of the flexor tendons I am rather sceptical. I am not satisfied that I have as yet seen much of this; that it can never occur I would not affirm, but that it frequently takes place I do not believe. The situation of the bony growth, as respects its contiguity to an articulation, must, I believe, materially influence the existence or otherwise of lameness, because of the chances of involving the fibrous structures of the joint and the articular bone surfaces in disease. A more

certainly inducing element of lameness in Splints than simple position is their association with the unnatural process we recognize as inflammation. The greater number of cases of Splints owing their existence to unnatural condition of ligamentous or periosteal tissue, *i.e.*, to particular local influences, are inflammatory in character; the greater number, intimately dependent on some general or constitutional tendency, start into existence as examples of hyperplasies apart from inflammation. The former are rarely free from pain and consequent lameness; the latter, wherever occurring, do not as a rule show either pain or lameness. It is not to be forgotten, however, that many of the latter variety—those which may be regarded as true bone tumours, from their size or position, although not primarily or essentially inducing lameness simply in virtue of their existence—may, under certain conditions, become acutely painful, and develop lameness. This we sometimes observe when the bony enlargement offers an object for the opposite foot to strike, inducing in the growth inflammatory changes. A few, it is true, may, because of their mere bulk, dispose to disturbance of action of the tendons; these, however, are not numerous.

2. *Time occupied in the Development or Growth of Splints.*—This is to us sometimes a question of importance, as related to the existence of soundness of the animal at the time of purchase. Many of these osseous growths, owing their origin to changes occurring in the inter-osseous ligament, being hid from detection, afford us small chance of determining the period occupied in their appearance; others, however, particularly these starting from the main bone, are from their position more under our observation. These latter, when not owing their existence to inflammatory action, and not usually attended with pain or lameness, occasionally start into existence, and develop to a considerable size in a very short period. I once observed in a mare of my own a growth of this character, firm, well defined, and symmetrical in form, develop to the size of half a pullet's egg in ten days. The mare was an aged animal, and during the growth of the tumour never was lame nor laid aside from regular work. Although, as a rule, bony growths connected with bone when once formed do not seem disposed to disappear, we not unfrequently find that Splints of this character in adult animals become less or ultimately vanish in a few years. It is well enough known that horses with Splints at five years old may not show these at ten. In the case of the mare which I have mentioned, the considerable enlargement, after attaining its maximum of growth, gradually suffered decline, and at the end of eighteen months had entirely disappeared.

3. Are Splints *of themselves and apart from Lameness to be regarded as constituting Unsoundness?*

This question may and has been answered in two very distinct but different manners. (*a*) *Splints, wherever existing, have been regarded as constituting unsoundness;* (*b*) *Splints are not to be regarded as constituting unsoundness, unless causing lameness.*

The former of these conclusions, based upon the fact that a Splint being a deviation from normal conditions, is therefore an unsoundness, while, viewed prospectively, for aught we know it may become a source of much disturbance, is a tolerably safe one as far as the examiner is concerned. The latter, which I know has been the ruling of more than one legal authority, is to my mind too expansive, and is an admission in principle too large not to be attended with difficulty. The settlement of the question is a delicate one, and frequently not unattended with difficulty, and must ever be largely influenced by the consideration of many conditions which surround it. If all horses are to be considered unsound simply because Splints exist on their limbs, many will be condemned wrongly, while if none possessing Splints are to be objected to, unless these are inducing lameness, many comparatively

useless animals will receive our approval—comparatively useless, I mean, because of these abnormal conditions of bone. In considering these cases individually, it is not only the actual condition of the growths which must be considered, but the prospective also—*i.e.*, as they may be related to the future of the animal's usefulness. It thus becomes very much a question of judgment on the part of the examiner whether an animal not lame, yet possessing Splints, shall be considered sound, and the value of his opinion on this point, as on many others, is largely dependent on his capacity and character. A certificate, we must remember, is not a guarantee, or an undoubted assurance of anything, only an expression of opinion, valuable chiefly because we value the power of observation and reasoning, as well as integrity of purpose of the examiner. This, I fear, is too frequently forgotten by all of us.

Spavins.—If the question of Splints and their relation to lameness and soundness or unsoundness are somewhat troublesome, the same may be affirmed even more positively and to a greater extent of Spavins. The question of what we are to understand by the term Spavin, although admitting of difference of opinion, is, I believe, less a matter of dispute than the settlement of the question whether or not the abnormality exists in any individual instance. Seeing that the existence of Spavin is so frequently not a matter to be reasoned upon, *i.e.*, to be inferred from induction, but one of hard fact cognisable by the senses, I must admit it is peculiar and not a little distressing that so much disagreement as to its existence should show itself. Nor will any description, I fear, however minute and correct, of the changes which structures undergo, nor yet of that which is regarded as a proper conformation of joint, ever perfectly correct this anomaly.

It is probably to be regretted that both disease of the great articulation between the tibia and astragalus and that of the multiple tarsal articulation should have received a like name. The latter, of which I now speak, Spavin par excellence, or *bone spavin*, is in our day usually recognised as implying a diseased condition of the bone elements of this compound tarsal articulation, specially of the inner section of the joint, and frequently giving indications of its existence by an enlargement of a bony nature over the head of the metatarsal and tarsal bones of that part.

4. *Forms of the Disease and Structures invaded.*—Although this disease of the hock has frequently been compared to the bone affection already spoken of, "splint," I scarcely think it is entitled to be looked upon as analogous—at least in the majority of its manifestations. We are all aware of the popular idea which is disposed ever to link Spavin to an obvious protuberance or growth over the inner surface of the hock, while the majority of us now acknowledge that the condition represented by the term Spavin may or may not exhibit visible change of form in the joint. I have already spoken in the case of *Splints* of the fact that many of these bony growths seem to arise independent of preceding inflammatory action and without lameness. Probably the same may be said of certain cases of Spavin, but I believe of a much smaller number—*i.e.*, the great majority of Spavins are truly inflammatory in nature. Those which may be regarded as non-inflammatory are usually such as are marked by obvious bone growth, distinct protuberance, and unaccompanied with lameness.

Besides the fact that Spavin may exist with or without visible manifestation in the form of bone growth or elevation, a fact generally admitted in our day, we have to consider also the probable origin or starting-point of the disturbance. This is more closely connected with the history of the disease and the influence which it is likely to possess on the locomotory powers and usefulness of the horse than aught else. Although, when fully established, there is good reason to regard Spavin as essentially a disease of the sclerous or bone tissue, it is yet probable that the earliest changes may, in many

instances, start from the fibrous, *i.e.*, the ligamentous or the periosteal. When originating in the periosteal and superficial tissues, the disease seems more likely to be confined to these than when having its birth in the intimate bone tissue, from which—when starting there—it usually extends from the centre of origin to the circumference. In the former development it seems also more likely to run a definite course or to exhibit a greater amenability to treatment. The attendance of lameness on the bone changes is more constant than in "*splints*," although we must not forget that considerable enlargement of the hock may exist with no lameness. While remembering that care is requisite in making deductions from examination of joints prepared by maceration or boiling alone, there yet seems a greater preponderance of evidence from the anatomy of the parts in favour of regarding the earliest changes as occurring, in the greater number of Spavins, in the intimate bone elements, rather than in the ligamentous or enveloping fibrous tissue. It is in this view that the prior occurrence and continuance of lameness previous to visible swelling or deposit, is believed to be accounted for.

2. *The relation of bony enlargements on the inner surface of the hock to the question of soundness.*

All who have much experience in the examination of horses for soundness must at one time or another have had more or less misgivings as to the interpretation which ought to be given to defects in the formation of hocks. I refer particularly to the existence of visible bony enlargements on the seat of Spavin, or at least what may be believed to be abnormalities of form and size there, the animal in the meanwhile being free from lameness. Here more decidedly than in Splint is any deviation from natural form to be regarded with suspicion. It is not, as in the former instance, where the enlargement is confined to the shaft of the bone merely, and may be supposed to affect it alone; here the contiguity to, or distinct involvement of, the articulation must be considered, with the chance that extension of the diseased process may further implicate other units of the joint. In no case where we believe such enlargement exists are we justified in allowing the examination to pass without note or comment. From experience we are aware that in many animals, if not congenital, these enlargements appear very early in life, and apart from any evident provocation; while at no period may they have been accompanied with lameness. Still the risks of their ultimately interfering with movement are too great to permit their existence to pass unnoticed, or to warrant us in giving an express opinion of ability to perform work until proved.

In adult animals, again, with otherwise well-formed joints, which are in regular work, and have neither been nor are at the time of the examination lame, we may frequently feel in a position to give an opinion favourable to the probabilities of the animal's future usefulness. In no case with a conviction that a bony enlargement exists over the inner surface of the hock can we regard a horse as undoubtedly sound, even although free from lameness. This is the opinion which I have ever held, although, as stated when speaking of Splints, I have heard a legal authority state that no horse, even with a Spavin, unless lame from that Spavin, was to be considered unsound simply because of the existence of the Spavin. Having the opinion already stated, and remembering the facts referred to, particularly the prospective character of these, I feel that here, as in many other instances, the issue of condemning or approving the animal rests very much with the examiner, and depends upon his ability to observe facts and phenomena, and judiciously and honestly to appreciate and interpret these; that, in short, there are no hard and inflexible rules which may not require to be modified by a consideration of conditions and influences.

3. *Time required to exhibit what is understood as the enlargement or growth indicative of Spavin.* This, as in the condition of common Splints, occupies

a variable period, depending much upon the character of the bone changes, whether these be of the osteo plastic or rarefying variety; whether the inflammatory action, when this exists, begins and is confined to the covering and connecting fibrous material of the tarsal units, or has its origin in the intimate bone tissue of these.

In the former the development of the tumour, with or without lameness, may be wonderfully rapid, as much so as in Splint; in the latter it is usually protracted, sometimes never occurring, but most frequently preceded and accompanied with lameness.

Sidebones.—Ossification, or rather calcification, of the lateral cartilages of the feet is peculiarly a disease of our horses of the heavier breeds, and probably is oftener seen affecting these in our cities than in country districts.

Although sometimes appearing early in life, this state is rarely congenital. It is not difficult of detection, and occasionally obtrudes itself on our attention by its extent, the physical changes of the structures invaded, and from its association with such diseased states of the phalangeal bones as Ringbone. The most obvious alterations in the cartilages themselves are increase in bulk and destruction of elasticity. The existence of this alteration is justly regarded with suspicion in all animals, particularly in such as have not reached maturity, while the great uncertainty which ever attends their existence as an inducing factor in the production of lameness renders the study of this unnatural state of more than ordinary interest to those engaged in examining heavy draught-horses. Although causes of an extrinsic character may in many operate largely in the induction of Sidebones, there appears reason to believe that such are less potent than what may be regarded as influences acting from within the animals themselves.

The most important question probably for us as practical veterinary surgeons, charged with the duty of giving an opinion as to the soundness or otherwise of animals, is, *Does the mere existence of this calcifying change in the pedal cartilages render the animal so affected unsound?* Here, as in both the conditions of bone change already noticed, the existence of Sidebones, in a broad and general sense, must be regarded as technical unsoundness. The accessory conditions, however, and the relations with which the state may be surrounded, modify in all cases the opinion which may be formed as to the chances of lameness following, as the sequel of this change in the cartilages. In some feet, which are well developed and free from other diseases, this alteration of the cartilages may not operate in inducing defective action. This is well shown when the phalangeal bones give no evidence of disease, and where the pasterns are fairly oblique and well formed as a whole. A like result, viz., absence of lameness, is more frequently observed when the alteration follows as the result of injury received by the parts being bruised from treads by a fellow-horse, or inflicted by the animal itself. The exact situation in the cartilage where the change develops itself tends to influence the appearance of lameness. It is less likely to exist when the posterior part of the plate is more particularly invaded, and more so when the opposite is the case. The so-called anterior Sidebones are usually more serious in their relation to the production of lameness than the posterior. The cause of this difference seems to be that in the former state the bone elements proper are more likely to be invaded than in the latter. The involvement of the cartilages in calcifying changes, in whole or in part, will ever be found a more serious matter when the pasterns are short and upright, with a tendency to exhibit bony deposit on their surfaces. In such cases, any changes in the cartilages are likely to be associated with lameness, and seem merely part of general calcifying changes invading the entire bones of foot and fetlock. In not a few advanced cases the calcified cartilages become united by their superior margins to the greater pastern

bone. In young horses the appearance of Sidebones unattended with lameness is a more serious matter than a like condition in the adult, and most objectionable when accompanied with badly-formed feet and short upright pastern bones. Animals possessing these characteristics are not likely to prove serviceable for any length of time on city streets or macadamised roads, while as stock animals they are objectionable.

Thus it is that, although we may decide that in the abstract Sidebones constitute unsoundness, many conditions occur which must modify our opinion as to the usefulness or otherwise of animals where this state exists. In the young and untrained, we cannot but regard them as a more serious matter than in adult horses which have been at work for years, and still are free from lameness.

Their appearance also in animals with feet and fetlocks of doubtful integrity and durability must always render us cautious in pronouncing definitely as to their probable usefulness, while their existence in stock animals is sufficient to restrain us from bestowing commendation upon horses otherwise faultless.

Having now indicated a few points deserving of interest in the consideration of Splints, Spavins, and Sidebones as related to soundness, which I believe may afford material for an interchange of healthy and suggestive ideas, I leave the subject in your hands, amply satisfied if I have suggested any fresh idea, or even raised a doubt on some preconceived opinion, for then will thought be exercised. I have purposely abstained from any notice of cause, symptoms, or treatment of these diseases, believing there is ample material for thought in what has been referred to, although there may be points too frequently ignored in discussing such subjects.

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(Continued from page 54.)

Now, gentlemen, while it may be admitted that inoculation to the individual animal, and to most of the animals exposed to the contagion, if carefully performed, with virus wisely selected, is of benefit in arresting the disease, can we give any decided opinion as to the length of time necessary for the complete isolation of the inoculated animals, or whether it will again be safe to allow them to mix freely with healthy cattle? If the inoculated animals, after recovery, cannot be safely allowed to mingle with the healthy ones, then inoculation for any other purpose than of saving individual loss in cities and large towns, where the cows are fed, and only leave the premises for the slaughter-house, would be a mistake. If inoculated animals are liable to spread the disease when again mixing with healthy cattle, the stamping-out process is by far the best one for farming and ordinary agricultural purposes, and it must either be practised in towns also, or the traffic in calves from those centres must be completely stopped, and the introduction of healthy cows prohibited for a longer period than is in force at the present time. But this is a point that requires to be further tested, and I hope the discussion that is likely to follow the reading of this paper will bring out the experience of others in this matter. Inoculation to save individual loss cannot be maintained at the expense of greater risk of continuing the disease in our country. I will here quote an extract from the regulations just issued by the Washington Department of Agriculture for the suppression of Pleuro :—

"Inoculation is not recommended by the Department, as it is believed that its adoption with animals that are to be afterwards sold to go into other herds, would counteract the good results which would otherwise follow from the slaughter of the diseased animals. It (that is, inoculation) may be permitted by state authorities under the following rules :—

"1st.—No herds, but those in which Pleuro has appeared, are to be inoculated.

"2nd.—Inoculated herds are to be quarantined with lock and chain on each animal. The restrictions are to remain in full force so long as any inoculated cattle survive, and these animals are only to leave the premises for immediate slaughter.

"3rd.—Fresh animals are only to be taken into inoculated herds at the owner's risk, and subject to the same rules as inoculated cattle."

The above is quoted from the *Scottish Agricultural Gazette*, Sept. 10th, 1886. I will only trouble you with one other quotation. In the Netherlands, where statistics and registrations in connection with inoculation have been carefully kept, it has been shown that, while in 1871, when slaughter, isolation, and non-compulsory inoculation were practised, there were 6,078 cases, in 1875, with compulsory inoculation, and slaughter of the affected animals, there were 2,227 cases, and from 1876, when there were 1723 cases, down to 1884, when the numbers were 232, slaughter of the entire herd in which the disease appeared was compulsory. This shows strong against inoculation as a means of eradicating the disease from our country,and its almost constant presence in Edinburgh, where inoculation has been strongly advocated, and indeed practised for the last ten years by one of its firmest supporters, is not very encouraging to those of us who have had less chance of watching the results.

I have endeavoured to give you the opinions of a few of those who have given the subject of inoculation careful consideration, and I cannot help thinking that none of them have made the matter very clear. Every one admits its benefit, when an outbreak occurs, in arresting the spread of the disease. But most of them point out the risk of inoculated animals spreading the disease if again allowed to mix with others that have never had it.

Professor Brown says, "that inoculated cattle, otherwise healthy, cannot communicate the disease to other cattle with which they may come in contact," but points out that, when inoculation is practised in a herd in which Pleuro-pneumonia has appeared, it is quite certain that among the inoculated cattle which are presumed to be healthy at the time, a certain proportion are already the subjects of Pleuro in a limited portion of the lungs, the disease not being discoverable without a post-mortem examination. These are the animals which are likely to communicate the disease, not from inoculation, but from the fact of their being affected, and, of course, he recommends the stamping-out.

Now, gentlemen, I cannot throw much light on this very important—in my opinion, all-important point, as the animals that were inoculated in my own practice have not yet had the chance of mixing with healthy cattle, in consequence of the local authority of the district being in doubt as to whether or not it would be safe. I have repeatedly seen the animals since the inoculation took place, and saw them only a few days ago, and I am clearly of opinion, notwithstanding the different opinions I have quoted, that they have completely recovered from the effects of the operation, and might with safety be placed among healthy animals. The inoculation is admitted on all hands not to affect the lungs, and indeed, only produces the changes on the place where the virus is applied. The risk spoken of by Professor Law and others, is when the full force of the operation is in progress, and while the exudate material is being formed in the parts. But when the animals have completely recovered, and the inoculated part healed up, or the tail removed, I am unable to see where the means of communicating the disease exists. In the animals I have spoken of in this paper, the tails are completely healed, and no disease can be communicated from that point. But the great danger consists in the imperfect cleansing and disinfecting of the byres and sheds where

the cattle have been standing, and in the dung and other droppings about the place. Unless every crevice in the pavement and wood-work is thoroughly cleaned and properly disinfected, the most effective means of re-producing the disease is left, and is, in my opinion, more likely to do mischief than the recovered inoculated cattle.

It is, no doubt, a fact that, as Professor Brown has pointed out, an animal may have the disease in a slight form and escape detection. But the process of inoculation will, if it does not develop the disease, place the animal among the list of inoculated ones, and until all traces of the effects of the operation have disappeared, there will be no chance of communication. It is only when the disease is in progress that contagion is likely, and although an animal may have had the disease in a slight form, and escaped being seen, I do not believe it will always be in a state to communicate the malady to others. It must be well known to some of the older members of the profession that lesions, the result of Pleuro, were often seen in animals, when slaughtered for beef in the ordinary way after having been fed (I am speaking of the time when restrictions were not in force), and were not the medium of communicating the disease. What I consider far more likely to continue the chances of contagion is what I have already drawn your attention to, viz., the getting quit of all contagious material in the byres and places where the animals have been, and I must take this opportunity of pointing out a very fruitful source, in my opinion, of spreading the disease in the country: I mean the traffic in calves.

It is well known that some of the best cows in the country are regularly bought up for town-dairies; many of those cows are in calf, and, after a few days' keep, the calves are sold to dealers, who again re-sell them in the country for rearing as stock, and it is just possible that some of them are the medium through which the disease is carried about, some of the dairies in our large towns being seldom clear of Pleuro; and, through the calves, the disease is communicated to other cattle while no one suspects it. How often does the country practitioner hear of unpurchased calves being taken ill and dying, and little notice taken of the matter, and no inquiry made into the cause of death. In the outbreak that I have described, upon close inquiry, and after a good deal of professed thinking, I was told that three calves had been purchased at Castle Douglas Market, or rather auction-sales, about the end of April or beginning of May, and that these calves died and were buried without any enquiry as to the cause of death. It was thought they had got cold in knocking about, and the owner stated that his opinion was that they had inflammation of the lungs, as he noticed them breathing rather hard. The disease broke out at four different centres around Castle Douglas, all a considerable distance from each other in opposite directions, and no traffic or communication with each other. What more likely than its being contracted through the purchase of calves? Depend upon it, there is far more danger in the traffic in calves than in older cattle. The calf trade is worse to watch, and has less notice taken of disease than the trade in older animals; consequently, the delay in finding out what is the actual state of matters, and the increased chance of further contagion, and obscurity as to its cause. In a letter from Mr. Cunningham, veterinary surgeon, Slateford, to the Editor of the *Kirkcudbrightshire Advertiser*, of date, 29th Sept., 1886, he says he could show at the present to any of the local gentlemen or farmers, 21 inoculated cattle that have stood scathless beside 7 bitter bad cases of Pleuro-pneumonia, and in another cow-house, 18 cows *not* inoculated, standing healthy and well beside 19 others that he inoculated with no sparing hand on the 20th April last, and in other premises 6 cows with long tails, standing unaffected besides 20 others that have been docked, and in speaking of its effect in staying the outbreak in a herd, he says—"It is simply three weeks' work, and the

outbreak ended." This is actually what has been the case with the outbreaks I have seen, and I have been trying to induce (and not without hope of success) some of the members of the Stewartry of Kirkcudbright Local Authority to make arrangements for the healthy animals on the farms where the disease has been, to be mixed with the inoculated ones, and if it is done, I will be quite ready to watch the result, and report to you what takes place.

I hope, however, that this question of inoculation, and the risks of mixing healthy cattle with the recovered ones that have been inoculated, may be well discussed, and some practical facts brought out that will be of use to any of us who may have to deal with the disease.

A. J. MACINTOSH, M.R.C.V.S., Dumfries.

The CHAIRMAN, in opening the discussion, said there was a great deal of Pleuro-pneumonia in Cumberland. At the present time the subject was therefore, of great importance. He had suggested inoculation to various clients, who had declined to adopt it. Among them was Mr. G. T. Carr, of Silloth, who has had the disease on his farm for the last twelve months. He had pressed Mr. Carr to allow his stock of about 220 cattle to be inoculated, but he could not be prevailed upon to do so.

Professor WILLIAMS, of the New Veterinary College, Edinburgh, was sure they were all much obliged to Mr. MacIntosh for his very elaborate and practical paper. The conclusions he had arrived at were similar to his own. With reference to inoculation, he had watched Mr, Rutherford for a number of years, and had seen some thousands of cases; not isolated cases, but herds numbering from fifties to hundreds annually, and his experience confirmed Mr. Rutherford's observations, viz., that if a subject has been carefully selected, the operation will invariably be successful, and that such an animal will be safe from Pleuro-pneumonia, and when slaughtered and made into beef, will present no symptoms of the disease. He could most emphatically bear out what Mr. MacIntosh had said—that it was certainly a preventive. With regard to the cases mentioned by Professor Brown where there are small patches of diseased lung, these are the cases, because unsuspected, that transmit Pleuro-pneumonia into healthy stock, he saw great danger. He thought Pleuro-pneumonia had been spread by allowing cattle that had had slight attacks, and presented no symptoms, to be taken and sold all over the country. When he had examined stock, and found Pleuro-pneumonia, the owner had said, "Well, this cow was a little bit poorly a few days ago, but is all right again." He had taken pity on the man, and allowed the animal to pass, the cattle were sold, and the result was the appearance of the disease in the herds into which each animal was introduced. He related the following incidents:—He was called to a county in the north, where he saw some 80 cattle. Four or five were slaughtered by the time he arrived, four or five presented marked signs of the disease; the rest were apparently healthy. It was near-term time, and as the tenant was leaving the farm, it was therefore a serious matter to him. The animals were more or less in fair marketable condition for slaughtering, so he advised the Local Authority to relieve the man of the responsibility, which they did. The loss was small, and the whole of these animals were slaughtered, numbering about seventy. Amongst these were twenty-five which presented no symptoms, but had limited Pleuro-pneumonia. Now supposing these cattle had been kept alive, and the days for non-removal of the cattle had expired, and they were then sold, not as fat, but as store cattle, here they had the disease disseminated from twenty-five centres. He was quite of opinion that no animal that has been in the company of Pleuro-pneumonia should be sold except for slaughter. As to the operation of inoculation, Mr. Rutherford would bear him out that if

an animal has Pleuro-pneumonia the temperature was quite sufficient; there would be an elevation, and Mr. Rutherford's success depended on the care in registration of the temperature. He worked only on animals which had no fever. If an animal resisted inoculation, it was better to have it slaughtered. If care be taken in the selection of the subjects, so as to see there is no elevation in the temperature, and that inoculation has taken its full effect in the tail, his opinion and experience led him to the conclusion—it might be erroneous—that inoculated animals were perfectly safe, and incapable of conveying the disease to others. He suggested that the Government or any Local Authority, or a combination of Authorities should purchase a herd of healthy cattle, and turn them among inoculated animals. This, he thought, would be a sufficient test. Mr. R. Rutherford, would tell them of the great care to be taken in the selection of the various animals. Some people have inoculated cattle without selection, and the result has been failure. They therefore say inoculation is no preventive. These gentlemen have been mostly unsuccessful in their operations. He further stated that, as far as his own observations and experience went, he thought there was no danger whatever in introducing inoculated animals amongst healthy stock.

Mr. RUTHERFORD, F.R.C.V.S., Edinburgh, said:—It is certainly for me a new experience to attend a meeting across the Border publicly advocating the practice of inoculation. It is not only a new experience, but it is a greater pleasure to hear it so ably advocated by an old fellow-student. I will try to follow Mr. MacIntosh's paper, and point out where he might have been stronger, and where I think Professor Brown and others are somewhat inconsistent in their correspondence. I notice that Mr. MacIntosh refers to it as simply being contagious. The disease is both contagious and infectious, but I will only refer to the operation. Professor Brown admits that inoculation does not produce the disease. Of that there can be no question at all. Inoculation of healthy animals cannot produce the disease; nor will it introduce the disease amongst the progeny of animals inoculated. I have had calves inoculated while very young, and I have inoculated cattle that were afterwards put to the bull, and in every way tested the subject. It does not affect them in the slightest degree, either one way or the other. The danger, which seems to lie more in the mind of Professor Brown, is that inoculation may pass over certain animals which have the disease in a limited area in the lung. That, I will admit, is a danger, and I have said so; but, mark me, if gentlemen are at all careful in their selection of animals, as Professor Williams pointed out, the chance of inoculating an animal already the subject of disease is an infinitesimal one. I do not know—none of us know yet what actual effect inoculation may have on an animal that has Pleuro in a modified form. I think that the introduced disease kills out in the slightest affected ones all tendency to the reproduction of the germ. And this I am most certain about, there is no possibility of introducing the disease in the lungs by inoculation, nor will an inoculated animal, otherwise healthy, communicate it. I know it to be so over and over again in scores of cases. I have deliberately inoculated animals amongst healthy ones without any result whatever. I only trust that a commission may be appointed to establish this—one of the most important points—and also to establish the other point, which Professor Brown has raised, about the possibility of communicating the disease by animals which have had it in a limited area, and that have been inoculated. Edinburgh has been a hot-bed of disease, and remained so until inoculation was put into force, and all the inoculated byres have remained healthy since that time. I prepared the other day the results of my experience up to the 31st of August. Several of the byres that there are mentioned have never had the disease before, and in the new premises at the date of their taking the disease had not a single inoculated animal in the place. The very reverse is the case; now inoculate

and you will never see the disease. Six months ago Edinburgh was threatened with an outbreak of the disease; now it owes its comparative clearance to inoculation; and in places in the neighbourhood in very many cases fresh cattle were put amongst those inoculated, and remain to this day as healthy as when they were put in, and I think they will remain so. There is some danger to the cattle in the premises into which they go; when you look at the floor, under the roof, walls, and stances, there is no wonder the disease has a habit of taking possession. I have asked people to keep their premises closed for a period of twelve weeks from the last case. Fifty or sixty days is not sufficient; three or four months at the very least should cover some cases I have had. I hope you will perfectly understand this, that I do not think that inoculated cattle, as Mr. MacIntosh says, that have recovered from the operation are capable of communicating the disease. I have never known them do it. As an instance I may mention that the last outbreak I had to deal with was in Forfarshire. There they had it; there it remained; and they would have it until inoculation or slaughter freed them, as there are no middle methods. The local authorities placed the case in my hands. Although the people at first said the outbreak had only been of a week or two's duration, it was found that it had been going on for some months. Animals were found to have been buried, and so bad was it on the occasion of my first visit that out of about fifty-eight animals, old and young, I slaughtered six in the presence of the local and seven or eight other inspectors. I was, however, suspicious about the other six, so much so that I marked them, and at my second visit I put them down, and they were all bad, although it was the case with some of them in an exceedingly minute degree. The disease was now stopped, and I had a letter from the inspector, who said the general condition of the animals was simply splendid, and he had no doubt they had seen the last of Pleuro-pneumonia.

Mr. CUNNINGHAM, M.R.C.V.S., Slateford, near Edinburgh, said: I would like to direct the attention of the meeting to the fact that in the correspondence now going on, it seems to be the opinion that there is only one way of operating. There is no greater mistake than that. What we advocate is Mr. Rutherford's plan of inoculation. In common with Mr. Rutherford, I am very glad to see that Professor Brown says that inoculation offers a certain amount of immunity. I have no hesitation in saying that it gives ample protection to stock. I am also pleased to state with Professor Brown that inoculated cattle will not communicate the disease to others. As to the cases referred to by Professor Williams and Mr. Rutherford, when the disease may be present to a limited extent, without showing any outward symptoms, in inoculation you have the very best means of discovering its existence. One very important point was that great care must be exercised in selecting proper material for the inoculation. Mr. Cunningham then described several cases where the experiment had been entirely successful in eradicating the disease, and gave very satisfactory statistics of his success. He further said veterinary surgeons had been accused of trifling with the disease; but he asked, "Are not such gentlemen as the one mentioned by our chairman, who refused to have his 220 animals inoculated, the real triflers?" There is no middle conrse. You must either inoculate or stamp out by putting the cattle down. To adopt the latter, you have to kill the animals, and pay the owners compensation, and I really think that the best thing to prevent the spread of the disease is a rigid enforcement of the Act and inoculation.

Mr. RUTHERFORD: Mr. Bell, of Carlisle, wrote to me a short time ago, asking for statistics showing the result of my experience. I sent him a list of outbreaks occurring in Edinburgh and other places where I was called between the 1st September, 1885, and 31st August this year. During that

time I attended on twenty-two different premises, none of which had been affected before, or, at any rate, for years previous, and the number of animals that had been in contact with diseased ones was 503. Within fourteen days of my first visit sixty of these animals were slaughtered for the disease. I inoculated 450. I lost four animals from the result of the operation, saved 431, eight being sold as fat. This, gentlemen, I think is sufficient reply to the pole-axe theory.

The CHAIRMAN called attention to Mr. Carlyle's article on the disease in the VETERINARIAN so far back as 1843.

Mr. HARRISON, Warcop, criticised the paper at some length, and thought the mutilation of the animal by the loss of its tail was a serious objection to the adoption of inoculation. He also suggested that cases of Pleuro reported, would, on investigation, be found not to be Pleuro-pneumonia at all.

Mr. JACOB DAWSON, Carlisle, suggested that the importance of the paper warranted the society in having it printed, thus giving the members an opportunity of digesting the contents more thoroughly than could be done by hearing it once read. He thought the advisability of adopting inoculation was substantiated, and that it ought to be made compulsory on all animals at a given age. He compared it to small-pox in a human being, and thought the same principle applied. As it was, the risk of mutilating the animal, by having to cut off a portion of its tail, was small. The average loss seemed to be about one in 100 cases operated on, and even that risk might be eventually reduced by experience. He thought these facts deserved to be better known.

Mr. RUTHERFORD: Mr. Dawson has mooted a matter which had better be replied to, in case the discussion is reported. He referred to making the experiments compulsory. He held that all contagious disease both in man and the lower animals will, sooner or later, find their preventive in some mode of inoculation. At the same time it would not be prudent to apply it always. Some diseases were so terrible in their nature that it is a boon there is a preventive; for instance, in Small-pox, the disease in the absence of inoculation or vaccination, would be terrible indeed. If the profession and the country at large were to enforce it in all cases, they would apply a terrorism to this disease which is unnecessary. It is not necessary to make it universal, and very probably, at this period of its history, it would undoubtedly create a great deal of dissatisfaction, and possibly might drown its reputation entirely.

Mr. CARLYLE, M.R.C.V.S., Carlisle, asked Mr. Rutherford if the parts showed, after inoculation, that the operation had had its effect.

Mr. RUTHERFORD, in reply, gave full details of the operation, its progress, and final results, and gave his reasons for selecting the tail in preference to other parts of the body for the operation, saying that the loss of the tail was a rare occurrence. He had not lost one during the last twelve months.

The CHAIRMAN, in reviewing the paper, described cases of infection where the animals had not been in contact with each other. For example, he referred to the present outbreak at Crosby, near Maryport. During the past twenty-five years he had seen a very great deal of the disease—in fact, for the last fifteen years his district had scarcely ever been clear. He could invariably trace the introduction to Irish cattle, and considered them the principal cause of the malady in Cumberland. He had also observed, on more than one occasion, that in certain localities the disease would lie latent in the system from February till May; but within thirty days after their removal to higher ground it would break out in a very virulent form. In order to illustrate this, he instanced several cases which had come under his immediate notice. Referring to the present mode of inspectorship, he considered there was great need of reform. He was now speaking personally, for he

had had ample proof, where a fully-qualified veterinary surgeon had come across a case of Pleuro, the Local Authority would act upon his report, but not accept his certificate. The discoverers of the disease had to stand aside, and allow another veterinary surgeon to be brought into the case, who was by these means introduced into his private practice! This was more than human nature could bear. Therefore, in the next case he finds he reports to the owner that he has Pleuro-Pneumonia, and he has the animal put down. A second, third, fourth, or even fifth case is slaughtered without reporting, and the remainder of the herd sold off right and left, and the disease spread all over the country. For the suppression of the disease now so prevalent in Cumberland and the south of Scotland, he would suggest to the Local Authorities to appoint every qualified veterinary surgeon inspector of his own immediate practice, with a principal inspector for the county to visit and confirm the first outbreak. If this was not done, or inoculation was not introduced, he was afraid it would be some time before they saw the last of Pleuro-Pneumonia.

Mr. MACINTOSH replied that he had been amply repaid by the discussion which had followed the reading of his paper. It was very gratifying that Mr. Rutherford, as the strongest advocate for inoculation, along with Mr. Cunningham and Professor Williams, had come so far to discuss this important subject. He considered that the want of proper cleansing was one of the points that required thorough ventilation. He would have no hesitation in putting his own cattle along with inoculated animals, but would press upon the Local Authorities to have the places thoroughly cleansed.

The CHAIRMAN said that after the byres had been well cleaned out, the best disinfectant he had found was to fold a few sheep in the places for a few hours evey day for a fortnight.

Mr. DONALD proposed, and Mr. LITTLE, V.S., Abbey Town, seconded, a vote of thanks to Mr. MacIntosh for his valuable paper, and the motion was carried *nem. con.*

Mr. CARLISLE exhibited an improved apparatus for administering chloroform by Mr. Roberts' method, as described at a previous meeting of the Society. He generously offered it for the use of members on the same conditions as their other instruments.

Votes of thanks concluded the meeting.

ONTARIO VETERINARY COLLEGE, TORONTO, CANADA.

Examinations.

THE Christmas examinations were concluded on the 21st December, when the following gentlemen, third-year students, were awarded the Diploma of the Council:—Geo. Dunn, Simcoe, Ontario; Jacob M. Fetzer, Centre Valley, Pa., U.S.; John F. Fisher, Brandon, Manitoba; D. Bell, Brampton, Ontario; W. S. Henderson, Arthur, Ontario; J. H. Hennessey, Hamilton, Ontario; William S. Hibard, Caledonia, Ontario; G. N. O'Leary, Pickering, Ontario; R. H. McQuinch, Dakota, U.S.; W. H. McNaughton, Vienna, Ohio, U.S.; J. E. Rayen, Girard, Ohio, U.S.; W. H. Riddell, Orangeville, Ontario; C. Wagg, Goodwood, Ontario; A. C. Wolfe, Durham, Ontario; J. H. Thornton, Georgetown, Ontario; M. E. Young, Belleville, Ohio, U.S.; T. H. Sterling, New Hamburg, Ontario; William Hunter, Brampton, Ontario.

J. E. Rayen, J. F. Fisher, W. S. Henderson, and G. N. O'Leary passed with Great Credit.

C. H. Shirland, Madrid, N.Y., passed a primary examination in Materia Medica.

THE NATIONAL VETERINARY BENEVOLENT AND MUTUAL DEFENCE SOCIETY.

THE VETERINARY MUTUAL DEFENCE FINANCIAL STATEMENT,

From January 1st to December 31st, 1886.

CASH RECEIVED.

1886.	£	s.	d.
Balance in Bank, January 1st, 1886	300	18	2
Subscriptions in 1886	83	9	6
Bank Interest, June	1	15	4
Bank Interest, December ..	2	16	4
	£388	19	4

CASH PAID.

1886.	£	s.	d.
Jan. 13, Mr. Bower Spool, in Settlement of Mr. Nuttall's case	10	0	0
June 18, Mr. Wm. Elam Spool, on Account of his case ..	10	0	0
Nov. 29, Mr. Devenport Bury, in Settlement of Mr. Briggs' case	32	10	0
Dec. 31, Sec.'s expenses, including 2,000 Circulars ..	5	7	9
,, Treasurer's Expenses ..	2	12	11
,, Cash in Bank	326	8	8
,, Cash in Treasurer's hand	2	0	0
	£388	19	4

Audited and found correct,

January 12th, 1887. JNO. B. WOLSTENHOLME.

THE NATIONAL VETERINARY BENEVOLENT FINANCIAL STATEMENT,

From January 1st to December 31st, 1886.

CASH RECEIVED.

1886.	£	s.	d.
Balance in Bank, Jan. 1st, 1886	211	1	1
Cash in Mersey Docks . ..	1,900	0	0
Jan. 5, Dividend on £1,300, less tax	25	2	8
April 21, Dividend on £600, less tax	11	4	9
Bank Interest, June	1	4	1
Aug. 3, Dividend	25	2	8
Oct. 12, do.	11	4	9
Dec. 31, Interest	2	2	3
	£2,187	2	3

CASH PAID.

1886.	£	s.	d.
Jan. 1, Mrs. Falding	5	0	0
,, Miss Orton, for Brown's Orphans	10	0	0
Feb. 5, Mrs. Russhall	5	0	0
May 11 ,, ...	5	0	0
Aug. 7 ,, ...	5	0	0
Oct. 28 ,, ...	5	0	0
Dec. 31, Cash in Bank	252	2	3
,, Cash in Docks	1,900	0	0
	£2,187	2	3

Audited and found correct,

January 12th, 1887. JNO. B. WOLSTENHOLME.

LIST OF SUBSCRIPTIONS FROM 1ST JANUARY, 1886, TO DECEMBER 31ST, 1886.

	£	s.	d.
Jan. 1. Edmund Nuttall ...	0	10	6
,, 4. Ralf Cox	0	10	6
,, 4. William Whittle ...	0	10	6
,, 4. James Rowe ...	0	10	6
,, 4. A. W. Caton ...	0	10	6
,, 4. Richard Reynolds ...	0	10	6
,, 4. Samuel Locke ...	0	10	6
,, 4. Cartwright & Son ...	1	1	0
,, 4. G. A. Banham ...	0	10	6
,, 4. Edwin Faulkner ...	0	10	6
,, 4. C. Morgan	0	10	6
,, 4. W. Bower	0	10	6
,, 4. Hy. J. Goodall ...	0	10	6
,, 5. J. B. Wolstenholme	0	10	6
,, 5. G. Samson	0	10	6
,, 5. R. C. Edwards ...	0	10	6
,, 7. Percy Gregory ...	0	10	6
,, 7. J. C. James	0	10	6
,, 7. J. Markham... ...	0	10	6
,, 7. T. D. Broad ...	0	10	6
,, 7. T. G. Chesterman ...	0	10	6
,, 7. William Carless ...	0	10	6
,, 9. A. H. Santy ...	0	10	6
Jan. 9 G. H. Pyatt ...	0	10	6
,, 9. J. W. Anderton ...	0	10	6
,, 9. J. D. Overed ...	0	10	6
,, 12. Sir F. Fitzwygram ...	1	0	0
,, 12. C. Sheather	0	10	6
,, 12. C. W. Elam... ...	0	10	6
,, 12. James Bale	0	10	6
,, 14. W. F. Peacock ...	0	10	6
,, 14. Thos. Cave	0	10	6
,, 14. J. Storrar	0	10	6
,, 18. C. Crowhurst ...	0	10	6
,, 18. B. H. Russell ...	0	10	6
,, 18. Hy. Thompson ...	0	10	6
,, 18. J. B. Ferguson ...	0	10	6
,, 18. C. Cawthorn ...	0	10	6
,, 19. F. Danby	0	10	6
,, 19. William Woods ...	0	10	6
,, 26. Thos. Barker ...	0	10	6
,, 26. J. Mackinder ...	2	2	0
,, 26. J. Woodger	0	10	6
,, 26. Hy. Hogben ...	0	10	6
,, 26. T. E. Angers ...	0	10	6
,, 26. Hy. Hogben ...	0	10	6

Feb. 2.	F. T. Stanley	£0	10	6
„ 2.	T. A. Dollar	0	10	6
„ 2.	F. W. Wragg	0	10	6
„ 4.	R. Roberts	0	10	6
„ 5.	Philip Deighton	0	10	6
„ 5.	Joseph Carter	0	10	6
„ 7.	John Freeman	0	10	6
„ 7.	T. D. Lambert	0	10	6
„ 9.	J. W. Axe	2	12	6
„ 15.	G. Newsom	0	10	6
„ 15.	J. B. Taylor	0	10	6
„ 15.	Thos. Walley	0	10	6
„ 18.	W. A. Field	0	10	6
„ 18.	F. Riddler	0	10	6
„ 22.	H. Olver	0	10	6
„ 22.	Thos. Secker	0	10	6
Mar. 11.	H. Ferguson	0	10	6
„ 11.	Batt & Son	1	1	0
„ 18.	R. C. Trigger	0	10	6
„ 30.	E. Beddard	0	10	6
April 3.	E. H. Leach	0	10	6
„ 5.	T. Hopkins	0	10	6
„ 5.	W. H. Webb	5	0	0
„ 10.	F. Blackley	0	10	6
„ 16.	A. L. Gibson	0	10	6
„ 28.	B. Cartledge	0	10	6
„ 30.	P. Walker	0	10	6
May 17.	C. Moir	£0	10	6
„ 22.	J. Lawson	0	10	6
„ 22.	A. Lawson	0	10	6
„ 31.	G. H. Darwell & Son	1	1	0
„ 31.	Stafford Jackson	5	0	0
„ 31.	William Root	5	0	0
July 29.	Thos. Pratt	1	1	0
„ 29.	William Broughton	0	10	6
Aug. 11.	E. Meek	1	1	0
Sep. 14.	P. Taylor	0	10	6
„ 14.	A. Taylor	0	10	6
„ 15.	O. Hill	1	11	6
„ 17.	T. Collins	0	10	6
„ 23.	J. Leather & Son	4	4	0
„ 28.	A. Over	0	10	6
Oct. 11.	Joseph Axe	0	10	6
„ 11.	G. A. Oliver	2	2	0
„ 19.	J. L. Barling	0	10	6
Nov. 7.	Hy. Blunt	1	1	0
„ 20.	Ball & Son	1	1	0
„ 22.	T. Briggs	5	0	0
Dec. 9.	R. A. Perrins	1	1	0
„ 20.	T. Greaves	0	10	6
„ 24.	George Morgan	0	10	6
		£83	9	6

NEW MEMBERS OF THE PROFESSION.

At the meetings of the Court of Examiners of the Royal College of Veterinary Surgeons held on the 16th, 17th, and 18th December, 1886, the following students from the Royal Veterinary College were admitted members of the profession:—

Mr. W. E. W. Baldwin	Warwick.
„ Harry Boyson Arnald	Clapham Common.
„ F. R. P. Gooderson	Great Bircham, Norfolk.
„ Alfred Johns	Truro.
„ Thomas N. Clarke	March, Cambs.
„ Robert W. Clarke	Horncastle.
„ H. A. MacCormack	Jamaica.
„ William Guy Patrick	New Quay, South Wales.

The following students passed their Second Examination on the 21st and 22nd December, 1886:—

Mr. W. Western.	Mr. T. Spenser.
„ H. Lukes.	„ T. J. McClean.
„ L. Savournin.	„ J. L. Perry.
„ R. H. Singleton.	„ F. O. L. Walpole.
„ J. W. Crowhurst.	„ *C. E. Doyle.

The following students passed their First Examination 22nd and 23rd December, 1886:—

Mr. F. Tucker.	Mr. A. T. Malvisi.
„ J. Fryer.	„ *H. S. Armstrong.
„ F. W. H. Wildgoose.	„ F. D. Hunt.
„ C. M. Robinson.	„ T. B. Gridley.
„ A. H. Sugden.	„ F. C. Gavin.
„ W. R. Stuart.	„ †J. B. A. Hare.
„ G. D. Tinkler.	„ L. M. Silverthorn.

* Marked thus passed with "Great Credit."
† „ „ „ "Very Great Credit."

A. W. Hill, *Secretary.*

Jurisprudence.

IMPORTANT DECISION TO CATTLE DEALERS AND FARMERS.

An action of considerable importance to parties interested in the buying and selling of calving cattle has just been decided in the Sheriff Court, Hamilton, N.B., at the instance of John Allan, farmer, Burnhead, Hamilton, against Andrew Struthers, cattle dealer and flesher, Hamilton. Pursuer averred that he purchased a cow in calf from defender in September, 1885, under a special warranty of "time up;" that she calved five days later, but two months before her proper time, and had therefore cast her calf, and was disconform to warranty; that defender at the sale knew that the cow's time was not np, and the representations then made by him to pursuer were false and fraudulent, and made to procure a higher price for the animal, or, at any rate, these statements were made without any proper knowledge on the point, and defender was therefore grossly negligent of pursuer's interest; farther, that the cow in question having aborted, as a direct result thereof, abortion was introduced into purser's stock, and fifteen other cows and queys belonging to him were influenced in such a manner that they all aborted, and pursuer had thereby suffered great loss and damage, and for which he now claimed £200 from defender. The defender denied the pursuer's averments, so far as material, maintaining, as a preliminary plea, that if the cow was disconform to the warranty alleged to have been given, it was pursuer's duty to have returned or rejected her at once, or to have placed her in neutral custody, all of which he failed to do or make timeous complaint as to her condition; and he also pled on the merits that he acted in *bona fide* and gave no special warranty as to the date of calving, and pursuer took the cow as she stood; that she had not, in point of fact, calved prematurely, and pursuer had sustained no loss or damage in any way attributable to him (the defender; and that even the pursuer did not take the proper methods to prevent the spreading of the distemper, and the damage thereby alleged to have been sustained being attributable to pursuer's own carelessness and neglect, he (the defender) ought to be assoilzied with expenses. A long proof was led, in the course of which a number of professional witnesses were examined on both sides, and Sheriff Birnie has now issued the following interlocutor and note, deciding in defender's favour:—Hamilton, 1st December, 1886:—"Having heard parties, procurators, and made avizandum, finds in fact (1) That on 15th September, 1885, the pursuer purchased from the defender a cow. (2) That it is not proved said cow was warranted time up. (3) That for some months previous said cow had been grazing with a number of other cattle in a field at Allanshaw; that in June previous one of said cattle picked calf; that she was immediately removed to a byre; that eight days thereafter she was sold to the witness Douglas and placed among his milch stock, and that no injurious results arose therefrom; that no other cow picked calf in said field while the pursuer's cow was in it, but that after she left another cow picked calf in said field; that the defender did not make the pursuer aware that the cow had picked calf in June. (4) That the pursuer's cow calved on 20th September; that it is not proved she aborted, but that it is proved that her calf was premature; that the pursuer thought at the time she had aborted or that her calf was premature. (5) That said cow calved in the byre about one o'clock in the day; that the other cows were at the time at grass, but were brought into the same byre in the evening; that between said 20th September and June following, fifteen of said other cows picked calf, each two or three weeks after each other; that neither said cow nor any of the others that picked calf were removed from among the pursuer's cows. Finds in law (1) that there was no warranty; (2) that the defender was not guilty of

fraud or negligence; and (3), that the pursuer was guilty of contributory negligence; assoilzies the defender from the conclusions of the action, finds him entitled to expenses, remits the account to the auditor to tax and report and decerns. (Signed) J. B. L. Birnie." *Note.*—The pursuer sues the defender for the loss sustained through his sixteen cows picking calf. He founds his claim (1) on warranty, and (2) on fraud or negligence, First, the point of warranty is narrow. The pursuer and Fleming say the cow was warranted to calve, that is to calve at her proper time, eight days after the 15th, but the defender denies that. It is not said she was warranted in the auction books; on the contrary the defender says she was entered as "time expected up," and this is not contradicted, that although in the bargaining after the auction, something was said as to her calving in eight days. It does not seem to me proved that the defender intended to give, or that the pursuer purchased on the faith of a distinct warranty; but assuming warranty, the pursuer did not comply with the rule of law immediately to inform the defender of the alleged breach, and offer the cow back, or place her in neutral custody, which is the more unfortunate, as, had it been done, it would, according to the evidence, have prevented all risk of infection. 2nd. The pursuer's case on fraud and negligence is that the defender fraudulently and negligently introduced an aborting cow into his stock. There are several answers to this. In the first place, to my mind, it is not true that the cow did abort. The signs of calving so long before the birth, and the period that the calf lived are against this. I think it is proved that the calf was premature. The feebleness, shortness of hair, and soft hoofs are in favour of this; but it was not urged that the defender was guilty of either fraud or negligence if the calf was merely premature, and on the evidence this could not have been urged, for, in his book produced, the defender had marked 3rd October, and although Joseph Hamilton thinks he gave him 3rd November, this is by no means certain, for the Kennedys, who sold the cow to Hamilton, think the defender's date was correct. The real ground of complaint on this head is that the defender failed to inform the pursuer that the other Allanshaw cow picked calf in June. I concur with Professor M'Call that the fullest information ought to be given by a seller to a purchaser; but I am unable to hold that the defender is legally responsible in this case, for the evidence is that a cow infected with abortion will calve in three or four weeks at furthest, while this cow was not sold until between two and three months after the other cow aborted. 3rd. Assuming that the defender had been guilty of fraud or negligence, it seems to me the pursuer has no remedy, having failed to remove the cow from his other stock. It cannot be too well known that in any abnormal condition at calving, whether from abortion, or premature calving, or calving at the proper time, the cow ought to be at once removed from among other calving stock, and that this will, in the great majority of cases, prevent mischief to that stock. In certain cases there is infection before the birth; but these are rare, and discoverable by those accustomed to cows. (Intd.) J. B. L. B.

Agents for pursuer—Messrs. Dykes, writers, Hamilton; agent for defender—Mr. William Stodart, writer, Hamilton.

Obituary.

NOTIFICATION has been made of the death of the following members of the profession: E. S. Hewens, M.R.C.V.S., Hayes, Middlesex, who graduated in 1865; J. D. Peech, M.R.C.V.S., Rotherham, who graduated in 1854; J. Macer, M.R.C.V.S., Hants, who graduated in 1869.

To the remarks we recently made with regard to the late Mr. Stanley,

of Leamington, Professor Walley furnishes the following interesting additions:—

To some, perhaps, it may seem somewhat out of place to write an obituary notice of one who departed this life in the year now drawn to its close, and in any case, it may be thought that it would have been more appropriate had it been written at the termination instead of at the commencement of the year; to such I would say that had circumstances permitted, I should have taken the opportunity of penning these lines immediately after the demise of him to whom they refer; and I further think that it is as profitable to contemplate the doings of those who have preceded us, at the commencement of a new, as at the close of an old year. The subject of my sketch, the late Wm. Stanley, of Leamington, was, at the time of his death, one of the oldest members of the profession, having, indeed, spent in its active practice as many years as it is the lot of probably the vast majority to live. He graduated in the year 1831, and most of what I have here to record refers to a period now a quarter of a century distant, when I had the privilege of an intimate acquaintance with him, and not infrequently acted as his *locum tenens*, during his prolonged absences from home in the discharge of his professional duties. Being, in 1861, assistant to his brother, the late Mr. E. Stanley, at Birmingham, it was to me both a great pleasure and a great privilege to run over to Leamington for two or three days, and give Mr. Stanley all the assistance I could—especially in the way of dispensing; and the preparation of seventy-two dozen balls, with other miscellaneous work, in one day, is not a bad sample of the work accomplished.

It would be impossible to refer to the one brother without, at the same time, thinking of the other, who pre-deceased him some years. Both of them were enthusiasts in their profession, both fond of horses and all connected with them; of extremely active habits, punctual to a degree in the fulfilling of their numerous appointments, and, though hasty in temper, just and honourable in their conduct to all men, and ever ready to make amends for any chance word or act that might have been construed in an offensive light; in each case no pains were spared to gather all the information that was to be had, and in applying it for the benefit of the suffering animal world, and it is recorded of Edward Stanley that on one occasion, in his early life, he disguised himself and made friends with a noted quack in his neighbourhood, with the object of discovering the secret of his reputed success in the cure of Poll-evil; he was successful in his efforts, but was disgusted to find that the empiric's panacea was only the root of the black hellebore plant. Another matter in which the brothers were alike was in their love of hunting, and in their aptitude to utilise its lessons in the practice of their profession, in the way of thoroughly testing all animals submitted to them for examination as to soundness, and in cutting short a journey by following the flight of the crow, instead of diligently plodding along over the highways and bye-ways of the country in which they practised. This peculiarity is shared by one at least of the descendants of Edward, with whom I have had more than one swinging scamper over hedge, ditch, and hurdle, with the object of saving distance.

Considering more closely the life of William Stanley, it may interest the younger members of the profession to know something of the conditions under which a large country practice was conducted in the active part of his career. I have said that he, in common with his brother, was passionately fond of the pig-skin (and saddles were made of the skin of the grunter in those days), and by no chance, if it were possible to do so, would he put his foot inside a carriage or other vehicle. "In the saddle," he used to say, "I feel safe; in a conveyance I never know what may happen;" and it may astonish those who have only experience of the present system of practising,

to hear that he considered a good stretch of work was the covering of sixty miles on one and the same nag, and on returning from such rides he needed nothing more than a wash, a beefsteak or a mutton chop, and a glass of wine, to be ready again for the road if circumstances required it. He always rode animals as nearly as possible thorough-bred, about 15-1 or 2 in height, and, in preference, mares; and, as it behoves all good horsemen to be, was careful of their welfare both at home and abroad. William Stanley was almost as deaf as a post; nevertheless he could detect, with unerring accuracy, a roarer or a whistler, and he never satisfied himself in the examination of a hunter until he had given him a "burster" over hedge, ditch, and field.

In diagnosis, he possessed wonderful intuitive powers, and in the differentiation of lung affections, deprived as he was of the accessory of the sense of hearing, he seldom went past the head of his patient.

In prognosis, he was as accurate as in diagnosis, and a glance was sufficient to show him that his patient was on the high road to recovery, or the reverse. He was a fearless and brilliant operator, and there are few men living at the present day who would undertake single-handed, as I have known him do, some of the most desperate operations we, as veterinary surgeons, are called upon to perform. Neurotomy, perhaps, was his favourite operation; always preferring the low operation, he attained to a greater measure of success than is commonly met with. He was one of the few who practised section of the tibial nerve for hock lameness, or of the plantar nerve for incurable lameness in the hind foot, and in a letter of some twenty-four pages, written to me in December, 1884, he relates with great gusto the case of a mare—the property of the late Mr. Robinson, and which afterwards came into the hands of Sir Charles Slingsby, and ultimately became the property of Lord Henry Bentinck. This mare met with a severe accident to one of her hind feet, and after the subsidence of the acute symptoms, remained lame and useless. He divided the plantar nerve, with the result that she carried each of the gentlemen mentioned for several seasons in the most brilliant fashion. She cost Lord Bentinck 175 guineas, and after his death was sold at Tattersall's for the sum of 140 guineas; and it was with a chuckle that Mr. Stanley directed attention to the fact that the professional men, who at different times examined her, never detected that the operation of neurotomy had been performed. In castration, when I knew him, Mr. Stanley preferred the eràser; but I must confess that, of this operation at least, I was not particularly enamoured, although he was on the whole successful. His anxiety for the recovery of the patients under his care was shown by the eagerness with which he watched for signs of returning health, and the pleasure with which he hailed such signs. I have seen him spend many precious moments in tempting the appetite of a patient with handsful of grass or hay or small quantities of corn, and his delight was unbounded when he succeeded in persuading it, as it were, to take even a single blade of grass from his hand. The enthusiasm of Mr. Stanley in the practice of his profession remained with him to the end, and a short conversation, which it was my privilege to hold with him about a year prior to his death, was to me like travelling over the vista of a distant past, and linking together the times that were and those which are. The pleasure thus afforded had only one drawback—his extreme deafness, and it was painful to be obliged to have recourse to a slate and pencil for the purpose of carrying on our conversation. A contemporary of Carless, Robinson, Lepper, and Litt, he was in every way as worthy; and although he never came to the front in a political sense, he was always anxious to know what was doing in the professional world. In one respect he was far ahead of his time, and very many years ago he said good-bye to politics, because those who were then in power refused to join him in an attempt to make the practice of the profession by any other than qualified

men penal; and almost the last words he addressed to me were in condemnation of the half-measure (with which we were fain to be content) embodied in the Veterinary Surgeons Act.

To those whose memory can carry them back to William Stanley's time, I trust this imperfect sketch of his life will be acceptable. To those whose years as practitioners are few, I hope it may be an incentive to emulate his enthusiasm, and to love the profession they have chosen for its own sake.

Notes and News.

LONDON DOGS.—Sir Charles Warren contributes to the *Contemporary Review* for January an article on this subject. After pointing out how much society has advanced in the love and care of animals, and in protecting them from cruelty, he remarks that the antagonism recently shown by rival parties, as to the operation of the Dog Laws, is a result of healthy sympathy on the part of the majority, causing natural differences with those who are lagging behind. Sir Charles continues:—"On the one side are those who look upon humanity as the first consideration, and wish to do justice to animals, but not at the sacrifice of the people; while on the other side are the sentimentalists and dog-fanciers, who care little for humanity, and who find their selfish amusements curtailed for the benefit of the public. It is actually a case of the public generally against a small party, but though so small, it is of considerable position, and wealth, and influence with the Press. With all this antagonism, however, there is a steady advance in healthy tone. There may be a difference of opinion as to whether a dog that appears to be mad ought to be killed, based upon the question as to whether he is dangerous or not; but all concur that if he is killed in public, some method must be devised by which it can be done without shocking the fastidious. The truncheon, which is given to the police to be used upon a man when necessary, is too cruel an instrument to be employed on a dog. In using the truncheon against a man, it is considered desirable not to hit him on the head, but on the body. On the other hand, if by accident a dog is hit on the body instead of on the head, it is at once recorded as cruelty. Again, if in despatching a dog an extra blow or two be given to ensure death, cruelty is immediately charged, though in what it consists has not as yet been stated. Altogether, the truncheon is doomed as the weapon by which a dog is to be despatched on an emergency, though what weapon should be used in its place is yet uncertain." The Commissioner of Police says that the wild and reckless statements that new and more severe restrictions were placed upon dogs, under his orders, after the 1st of April, 1886, are entirely erroneous. He adds:—"There has been no alteration in the manner of dealing with dogs under the various Acts for many years past. The method of proceeding is laid down by law, and the police have no option as to varying the process. The following returns will show the uniformity of proceeding during the recent prevalence of Rabies:—

"Killed in the Streets and Dogs' Home as rabid.

During the eight months ending March 31st, 1886 .. 305 dogs
During the eight months commencing April 1st, 1886 .. 274 ,,

Seized in the Streets and sent to Dogs' Home.

During the eight months ending March 31st, 1886 .. 27,137 dogs
During the eight months commencing April 1st, 1886 .. 21,682 ,,

"This at once disposes of the statement that, during the progress of the disease, some new and specially restrictive measures with reference to the dogs were suddenly introduced. The same vigorous action was pursued throughout so

far as the dog is concerned. But, on the other hand, owing to the inconsistent decisions of magistrates, the owners of dogs were not summoned in any numbers until June, 1886, and it is instructive to notice that the outcry, with regard to the restrictions on dogs, was raised at the time when the owners were brought before the police-courts, for not keeping them under control, and lapsed at the time that the summonses were discontinued. The inference is that so long as there were only restrictions on dogs, their owners made little or no objection, but as soon as the law was put in force against the owners, in the interests of the public, to compel them to protect the public against their dogs, and as soon as the owners were inconvenienced by appearing in the Police-courts, a violent outcry was raised on behalf of the dog. . . . . It is exceedingly amusing to find, on looking into the records of the past relating to Rabies, that on each occasion when precautions have been taken to prevent its spread, there has been an agitation on the subject, increasing as the laws passed have been more restrictive. So that as the majority pass more stringent measures, the abuse of the Executive for putting those measures in force is more unmeasured." "Sir Charles Warren refers to several periods when Rabies among dogs was specially rampant in this country—in 1759-60, in 1856, 1865, and the following year. In the latter year a notice, under an Order in Council for the Cattle Plague, was issued as to stray dogs in Middlesex, directing that any dog found straying without a collar with the name of the owner "may be destroyed." Under the Metropolitan Streets Act in 1867 the Commissioner was enabled to direct all stray dogs to be seized, and this practice has continuously remained in force. Mr. Fleming, in his "Rabies and Hydrophobia," states that after this "the number of cases of Hydrophobia immediately began to diminish in and around London." In Scotland-yard there is a diagram showing the number of dogs seized monthly since 1868. Sir Charles says:—"During the current year there has been a steady decrease in numbers seized each month, until in November the normal number has been reached. The total will probably exceed 48,000, but, owing to the great number restored to owners, the number taken to the Dogs' Home will probably not exceed 35,000. . . . . The number of mad dogs found in the streets of London fluctuates from year to year and from month to month, and the monthly diagram since 1879 is most instructive. It shows a gradual increase year by year up to the present year, and it shows also that the number invariably falls about February and rises again to July or August, except under abnormal conditions, as in 1885. In every year the maximum in the hot weather is four or five times the minimum in the cold weather." The Commissioner of Police points out that the returns of the Registrar-General show that Hydrophobia is on the decrease, but concludes with the remark that, while Rabies has been nearly extirpated about London, it is still prevailing in the surrounding districts, and will continue to do so until some common action is taken throughout the country.

VETERINARY HONOURS.—It gives us much pleasure to announce that Mr. T. Briggs, F.R.C.V.S., Bury, has been placed on the Commission of the Peace. Mr. Bell, M.R.C.V.S., Carlisle, who has been for some time Captain of the Fire Brigade of that city, has been presented with a valuable testimonial by the brigade, in recognition of his services to it and in it.

HYDROPHOBIA AND RABIES.—The Academy of Medicine, in Paris, recently concluded an animated discussion on the Pasteur system, in which both members and auditors showed as much party passion as is displayed at political meetings. M. Peter gave details of five deaths among M. Pasteur's patients, apparently due to the paralytic form of Rabies, that is to say, to the Pasteur, not the canine, virus. On the other side it was stated that of 2,682 persons treated up to the end of last year only 31 had died, 10 of these being

among the 186 persons bitten in the face or head. No death, moreover, had occurred among 50 of those 186 persons to whom the intensive treatment had been applied. As in most discussions, each of the two parties adhered to its original opinion.—At Bolton, a few days ago, a man named Mullett died from Hydrophobia, after terrible suffering. He was bitten on the 16th of October last by a terrier bitch, with which, it is stated, he had been playing. The wound bled freely, was cauterised, and sucked by a young man, and the dog, which showed no symptoms of Rabies, was destroyed.—A boy, named Walter Wood, residing at Hallroyd, near Rochdale, was bitten by a mad dog about five months ago, but the symptoms of Hydrophobia did not set in until the middle of January, when he died. Two other lads and a horse were bitten at the same time.—The occurrence of two cases of Rabies a few weeks ago determined the local authority of Cheshire to proclaim the Nantwich Division of the county. It was known that several dogs had been bitten; and two fresh cases of certified Rabies have just been reported. The owner of one, a terrier, was ascertained, but the other, a retriever, was found and killed on premises whereon it was a stranger. In the attempt to seize the dog one of the police got bitten. For this account we are indebted to the *Yorkshire Post* of January 7th, and it is plain, from the incident, that the "difficulty with dogs," which caused so many heartburnings in the metropolitan district in 1886, is likely to be repeated, over a extended area, in 1887.—Great excitement was caused in the neighbourhood of Houghton, near Preston, one day in January, by the ravages of a mad dog. Early in the morning the dog, of the collie breed, bit a girl named Elizabeth Sharpe, at Houghton railway-station. It bit several other persons. The dog was at length killed. Mr. Crook, coal merchant, who was bitten, was to be sent to M. Pasteur, at Paris. —The *Notts Guardian* states that the attention of the borough authorities and of Mr. W. Taylor, veterinary surgeon, and Messrs. Pyatt and Cave, veterinary surgeons, had been called to the condition of a cow belonging to Alderman Ford. The cow was on the farm at Bradmoor, and a few days before it began to manifest rabid symptoms of a most decided nature. The whole of the medical gentlemen concurred in their opinion as to the state of the animal, and it was their intention to have it slaughtered, so that the brain and a portion of the spinal cord might be sent up to London for experimental purposes. It is stated that in September last a dog was seen on Mr. Ford's farm, and, from its strange ways, it was concluded that the animal was mad, and it was immediately shot. The residents on the farm believe that the cow was bitten by the dog.

HORSE STATISTICS.—In view of the discussion that is going on regarding the horse supply, says the *Live Stock Journal*, more than usual interest attaches to the figures that have just been published, showing the imports and exports of horses during the past year. It appears that the number exported was 7,323, compared with 6,196 in 1885, and 6,973 in 1884. The value in 1886 was £409,013, or an average of £55 17s. per head. In 1885 the value was £371,406, or £59 19s. per head; and in 1884, £406,915, or £58 7s. per head. The statistics show the following as the destinations of the exported animals:—

	Number.	Value.
Belgium	1,760	£75,407
France	498	30,884
United States	1,173	72,004
British North America	1,580	109,986
Other Countries	2,312	120,732
	7,323	£409,013

Turning to the imports, we find that during 1886 11,027 horses were brought

into this country, against 13,023 in 1885, and 12,928 in 1884. The value in 1886 was £189,936, or an average of £17 4s. per head. In 1885 the value was £195,624, or an average of £15 per head; and in 1884, £256,789, an average of £19 16s. The following table shows the numbers of horses imported and exported over a considerable period:—

Year.	Horses.		Year.	Horses.	
	Imported.	Exported.		Imported.	Exported.
1831	1,063	718	1868	1,575	4,091
1841	339	4,538	1869	1,849	2,210
1851	3,443	1,526	1870	2,387	7,202
1852	3,179	2,485	1871	3,448	7,172
1853	6,819	1,902*	1872	12,618	3,383
1854	6,063	2,346*	1873	17,822	2,816
1855	2,432	3,616	1874	12,033	3,050
1856	2,970	1,711	1875	25,757	3,135
1857	2,807	1,574†	1876	41,148	2,659
1858	3,458	2,072	1877	30,524	2,258
1859	2,130	4,417	1878	26,521	2,967
1860	1,761	3,199	1879	15,246	5,018
1861	1,595	2,960	1880	9,264	5,128
1862	1,978	4,318	1881	9,950	6,108
1863	1,441	5,204	1882	8,827	6,444
1864	1,357	4,644	1883	9,627	7,376
1865	1,332	4,440	1884	12,928	6,973
1866	1,646	4,069	1885	13,023	6,196
1867	1,461	4,136	1886	11,027	7,323

* Crimean War. † Indian Mutiny.

Correspondence.

INOCULATION AND CONTAGIOUS PLEURO-PNEUMONIA.

SIR,—In the current *Journal* there appears a rather windy letter, cruelly attacking me; and, as is usual in such cases, where the writer has nothing to lose, the name is not concealed, but given in full. Having consulted my own feelings and acting accordingly, I shall not treat this individual with contempt.

Being anxious that the members of the profession should have before them both sides of the story, I have taken the liberty of seeking from Mr. Rutherford, his version of the recent outbreaks of Contagious Pleuro in the Stewartry of Kirkcudbrightshire. The facts merit preservation. Those who are acquainted with Mr. Rutherford know that his word is thoroughly trustworthy. The following is the substance of his communication to me:

"1st. On or about the 13th July last, I received a telegram from Messrs. Biggar, of Chapelton, Kirkcudbrightshire, gentlemen who were strangers to me, informing me that they had Pleuro-pneumonia among a valuable stock, and requesting my advice as to whether they should inoculate. Following the telegram, I received a letter, giving full particulars of the outbreak, and the temperature, etc., of the cattle then on the Chapelton Farm, and also of the cattle on their adjoining farm of Grange.

"Replying immediately to my telegram and letter sent in reply, Messrs.

Biggar requested and urged my immediate attendance. I replied saying, that owing to being officially engaged at the examinations I could not attend, but that I would send Mr. Manuel, M.R.C.V.S., Hawick, a late pupil, who would attend to the matter, and that he had my entire confidence in doing so. Mr. Manuel arrived at Chapelton on the 15th or 16th; and after an individual examination of the stock on both places, he found those on the Grange to all appearance healthy; while of the sixteen animals (pedigreed polled) then remaining at Chapelton, he had five put down as diseased and inoculated the remaining eleven. I may mention that the number of animals on Chapelton at the commencement of the outbreak was forty; of these, twenty-four were killed for Pleuro, five fat sold to the butcher, and eleven were inoculated successfully and saved. These eleven are alive now, well and mixed with others not inoculated, but which, up to the present date, are also well.

"To resume: Mr. Manuel saw them again on July 24th, and reporting Messrs. Biggar's anxiety for a speedy personal visit from myself, I went there on the 26th, and, after examining all the cattle on both places, was entirely satisfied with the measures adopted. Messrs. Biggar were quite willing to have the Grange cattle also inoculated, but as I could find nothing wrong, I advised leaving them alone—but to be thermometrically tested every three days—which was done by Mr. James Biggar. These cattle remained well and are well now. I dismissed the outbreak on August 5th, much to my own and Messrs. Biggar's satisfaction.

"2nd. On August 8th, I received a telegram from Mr. Davidson, Inspector to the Local Authority of Kirkcudbrightshire under the Contagious Diseases (Animals) Act, requesting my attendance at Lochside, a place some miles away from Messrs. Biggar's, to arrest an outbreak of Pleuro. I went there on the 9th, being interviewed on my way, at Dumfries, by Mr. M'Intosh, M.R.C.V.S., of that town, who had been in attendance at Lochside, and whom, as he was more than sceptical of the utility of inoculation, I invited to come and watch the work for himself. He did, and you have his approval of it, in his paper lately read at the Border Counties Meeting. At the farm, I found, I think, twenty-three or twenty-four animals, old and young, that had been exposed to the infection. Of these, two or three were found diseased and put down at once. The lymph was taken from one of them; twenty-one were inoculated and did well. No further cases appearing, I dismissed this outbreak on August 24th. I may mention that on this farm there were fifty other animals grazing in a field close to where the infected animals had been—but no actual contact having taken place, it was decided to leave them alone. In a letter received from Messrs. Clark, a few days ago, I am advised that their stock is now in good health.

"3rd. On September 1st, I received a telegram from Mr. Davidson, the Inspector to the Local Authority, to come at once to an outbreak at Mr. Hyslop's, of Auchenreoch, a small farm, some four or five miles distant from Messrs. Biggar's.

"I found, I think, twenty-one animals, old and young, on the premises, of which three were badly affected and put down at once. Eighteen were inoculated, but of these, three were very strongly suspected. On my second visit I was satisfied the three were diseased and had them put down, the remaining fifteen being saved, and all these are now well. I dismissed the Auchenreoch outbreak on the 16th, Mr. Irving, M.R.C.V.S., having been in attendance with me all the time.

"4th. On the date of my first visit to Auchenreoch, I was requested to call and examine the stock at Mr. Irving's, of Blochairn, where an animal was isolated on suspicion. I found no indication of Pleuro, and there has been none.

"5th. On the date of my second visit to Auchenreoch, I was requested by Inspector Davidson to accompany him to Torr, where an animal had been reported as affected, by Mr. Campbell, F.R.C.V.S., Kirkcudbright, on the day previous. Mr. Campbell was to be in attendance, and was so. At Torr, I was shown four animals, a bull and three others. One animal was a bad case, but had been treated for some disease of the stomach, back of head blistered, physicked, etc., etc. The bull was thin and evidently just recovering from severe illness. One animal was slightly suspicious; and one was all right. so far as I could see. Mr. Campbell told me that the owner was not going to inoculate, and, to the best of my recollection, I replied that it was not an outbreak admitting of inoculation—one bad, one apparently through it, and two remaining. My advice to Inspector Davidson, whom I was there to advise, was to leave them alone and if possible, have them put down, and I believe they were ultimately, but whether or not a *post-mortem* was made I do not know. I should mention that I was not there to consult with Mr. Campbell. I was there to examine the stock, and advise the Inspector, Mr. Davidson, for the information of the Local Authority. Mr. Campbell was there, I presume, just as Mr. M'Intosh and Mr. Irving were at Lochside and Auchenreoch respectively.

"It was immediately after the Torr visit that Mr. Campbell's speech and letter came to my notice. His speech I considered nonsense, his letter ditto, coupled to an inclination to directly attack my work as a specialist, at a time when it was under close observation.

(Signed) R. RUTHERFORD, F.R.C.V.S."

January 4th, 1887.

Please permit me, very briefly, to review the concluding portions of Mr. Campbell's letter. In these parts he reminds me of a stump-tailed bull in fly time, running amuck until he bogs himself. But I must follow him. I have no desire to injure him. He does that most effectually himself. I sent you a fair notice of the facts, as they appeared in the newspapers at the time. By his letter to the local paper, and his spouting at the Local Authority meeting, Mr. Campbell brought the combination of "Eastern Wisdom"—as he delights to call it—upon himself. Neither his speech nor his letter was justified by the events. If the newspaper did not correctly report him, he should have contradicted the objectionable matter.

A man, who ventures to apply the words, "acting as an empiric proclaiming his nostrums," to an acknowledged specialist and legitimate practitioner, should exercise caution. Let me warn him that he is treading dangerous ground, and bidding hard for a citation from the Examiners of the Court of Session. It may be that Mr. Campbell is no coward. I don't know. Brave men seldom brag. His reference to "Moonlighters," "masked faces," and "missiles," savours strongly of the politician of the pothouse, where the *spiritus frumenti* is of the vilest kind.

I am assured that Mr. Campbell was not Veterinary Inspector to the Stewartry Local Authority when Mr. Rutherford visited the district. Doubtless, Mr. Campbell has been the servant, in some capacity, of the members of that body for twenty-one years. His qualifications do not seem to be so well known as his letter attempts to indicate. There is nothing to show that his ideas of his own competence to inoculate are correct. I refuse to accept his "high falutin" on this point. He produces no record and cites no cases. Something more is required of a professing inoculator than the bare assertion. That the Stewartry Executive thought so, when they sent for Mr. Rutherford, is beyond cavil. Mr. Campbell's inconsistence is remarkable; for, after tilting at "poor Peter" the "unknown example of manliness," damning "the shadow" and fearing "the slave," he, perhaps thinking,—

"Small curs are not regarded when they grin;
But great men tremble when the lion roars,"

solicits the publication of "Farmer's" letter—the production of an anonymous layman.

I have no wish to dispute Mr. Campbell's good name; that it is dear to him is likely enough true; but, if he desires to enhance its public value, he should leave specialists alone, write seldom to the press, learn *how* to inoculate successfully, and allow "the disciple" to remain in obscurity as—

PETER RAMUS.

INSPECTION OF HORSES AT SHOWS.

SIR,—Allow me a little space for a few comments on the remarks made by Mr. Greaves at the meeting of the Liverpool Association, in the discussion on my paper, on the "Inspection of Horses at Shows, as also for Purchase." (1) Mr. Greaves falls into the same error as did Professor Robertson, viz., by making me say, "That I consider veterinary surgeons are the best judges as to the qualifications of horses for special purposes." What I did say was, "That the veterinary surgeon is the best qualified to judge of the probable results of any hereditary defect when a horse or colt is, in due course, put to hard work." This proposition, I still hold, is correct; and if Mr. Greaves will re-peruse my paper, he will find that I there stated that "the majority of judges (of heavy horses, used for town purposes) are ignorant of the effects of town work, as their experience is confined to the effects of agricultural or rural work." This, also, I hold to be incontrovertible. (2) Mr. Greaves experience as to the percentage of unsound horses brought to him for examination is largely confined to English-bred horses, while I spoke mainly of Scotch-bred horses. (3) When I wrote the following sentence:—"The function of the veterinary surgeon is that of a protector and arbiter," I did not for a moment assume "That it was the duty of the veterinary surgeon to exert his ingenuity to discover some defect, with the object of showing his talent and exhibiting the amount of scientific knowledge he possesses;" but I did assume that, when a veterinary surgeon is paid a fee to examine a horse, he is bound to exercise his abilities to the uttermost in behoof of his client; and, if his client suffers loss, he is morally, if not legally, responsible for such. If Mr. Greaves' experience teaches him that there is little or no chicanery practised by horse copers, he dwells in the horse-buyer's Elysium, and Manchester is not what it used to be.

T. WALLEY.

Royal Veterinary College, Edinburgh, 12*th Jan.*, 1887.

A NOTE ON "THE VETERINARY PHARMACOPŒIA, MATERIA MEDICA, AND THERAPEUTICS."

SIR,—In our work just issued, we have ventured to diverge considerably from the beaten track. Although we have discarded very few of the older remedies, striving to be at once conservative and progressive, we have introduced several remedies hitherto not in general use. Most of these have been proved to be indispensable adjuncts to the therapeutic resources of the veterinary surgeon. The following may be mentioned as being of great importance and value:—Boric acid, hydrochlorate of apomorphine, coca together with the hydrochlorate of its alkaloid cocaine, ergotinum, arseniate of iron, citrate of iron and ammonium, oil of eucalyptus, chromic oxide, jaborandi and its alkaloidal salt, the nitrate of pilocarpine.

It will be observed that we have not included convallaria majalis, a remedy mentioned by Mr. J. B. Gresswell in "The Veterinary Pharmacology and Therapeutics," as being valuable in the place of digitalis in cases of functional and organic disease of the heart. Shortly he proposes to give an

account of cases in equine practice in which he has used this remedy with very encouraging results.

We have throughout avoided endorsing those drugs whose value cannot be said to be thoroughly established beyond all doubt.

We have laid great stress on the portion of our work which deals with therapeutics, and especially in the case of the more important drugs. Together with the uses of medicines, we have, where necessary, given accounts of their physiological actions. This part of the work was, as we have said elsewhere, written by Dr. Albert Gresswell.

It is essential to point out the following *errata*, and this we are pleased to be able to say is of the greater importance, insomuch as the sale has been even already large, far more so than we ventured to anticipate would be the case. May we hope that the possessors of the book will make the following corrections:—

On page 25, in the fourth line from the bottom of the page, for "eight grains" read "ten grains."

On pages 31 and 34, for "preparations" read "mode of preparation."

On page 47, under "Mode of Preparation," for "broke" read "broken."

On page 52, before "uses," insert "Preparation.—Glycerinum Acidi Tannici."

On page 61, for "Unguentum Chrysarobinæ" read "Unguentum Chrysarobini."

On page 66, for "Liquor Epispasticus" read "Linimentum Cantharidum (or Liquor Epispasticus)."

On page 80, under "Posology," transfer the words "by inhalation" from their present position to the end of last line, reading—"Four times the above doses may be given by inhalation."

At the bottom of page 102, read at the end of the last line "(=$\frac{1}{10}$ to $\frac{1}{6}$ grain)." In the third line from the bottom, for "Injectio atropinæ sulphatis hypodermica" read "Liquor atropinæ sulphatis."

On page 123, in the seventh line from the bottom, for "chloroform" read "chlorodyne."

On page 141, in line 2, read "By inhalation as a general anæsthetic."

On page 203, in lines fourteen and fifteen, for "3 grains" read "1 grain."

On page 312, in line nineteen, for "bruises" read "tissues."

MESSRS. GRESSWELL.

VETERINARY LITERATURE IN "PENNY NUMBERS."

SIR,—In April 1885, I complained through the medium of the Yorkshire Veterinary Medical Society, of a series of articles on veterinary medicines and surgery, entitled "Diseases and Disorders of the Horse," then being published in the *Yorkshire Weekly Post*. The members present considered them a distinct breach of professional etiquette, and calculated to injure the veterinary surgeon in his daily practice.

Certain gentlemen were deputed to write to the authors, Messrs. Gresswell, of Louth, expressing the opinion of the meeting regarding these articles, which brought from them a letter, which you published in your July number of that year. In that letter they state in effect that "had they known our objections, they would not have supplied them," but inasmuch as there would be only a "limited number," some of which were in type, and the rest "almost completed," I allowed the matter to rest, without then troubling you with a letter.

This "limited number" appeared weekly until the end of the year, when they were published in book form, and sold at a low price by local publishers.

Now, sir, the reason I now trouble you is, as you will see by the enclosed

advertisement, Messrs. Gresswell again intend publishing veterinary science in penny numbers, in the same weekly paper, this time teaching their readers something of "Diseases and Disorders of the Ox."

My particular objection to the last series is that valuable formulæ, which exclusively belong to the profession, were thrust into the hands of the public, and that they were used to our disadvantage I have no hesitation in saying. For my own part, I fail to see any advantage in educating the public so cheaply in veterinary matters; they, the public, reap an advantage at our expense, with what ulterior benefit to ourselves I cannot perceive.

I certainly should have thought Messrs. Gresswell's letter of July, 1885, less hypocritical had they "conformed to our desire," after knowing our openly expressed objection, or had I learnt that a similar series of papers to the last had been published in his own local newspaper.

Apologising for the length of my letter,

THEO. C. TOOPE, M.R.C.V.S.

Knaresboro', Yorks.

ENSILAGE FROM A VETERINARY POINT OF VIEW.

SIR,—May I ask if any of your readers have noticed whether the *Bacillus anthracis* and its spores are destructible or capable of multiplication in the silo? The *B. subtilis* is present in specimens of ensilage, and it is possible that Anthrax, Black-quarter, and other diseases may be in the future so spread, for where the harmless bacillus thrives, there the pathogenic organism may prosper.—I am, sir, yours,

J. CAMMACK, M.R.C.V.S.

Kimberley, South Africa. *November 27th.*

REMOVAL OF THE EYEBALL.

SIR,—Seeing in the December journal an account of excising the eyeball of a mare, I trust I am within the bounds of professional etiquette if I criticise the manner in which the operation was performed somewhat severely. I agree with Messrs. Freeman and Smith that removal of the eyeball is an operation of rare occurrence; but, nevertheless, such cases should only be recorded when performed in a scientific and workmanlike manner, lest others follow the example described, and cause the poor animals operated upon a vast amount of unnecessary suffering. Mr. Freeman states that they first enlarged the opening of the orbital cavity by cutting the outer and inner canthus and stitching back the eyelids. These parts of the operation, I think, would be quite unnecessary, knowing from experience they can be done without. The next step described of removing the eyeball, I do not complain about; but the manner in which they attempted to check hæmorrhage was, in my humble opinion, the most barbarous and antiquated I have heard of since I entered the profession. The eyelids, they state, were in an inflamed and swollen condition; yet they stitched them so tightly and closely together that scarcely any blood could escape from the cavity, though it speedily filled and distended the eyelids, producing a large bulging swelling. Now, this must have caused the poor mare intense agony for some days, which might have been entirely obviated, as I will attempt to prove, by giving my experience of a similar operation which I performed, along with Mr. Elphick, some time ago, on a cow. The eye of this animal was in a similar condition to that described by Messrs. Freeman and Smith, with this exception:—An ulcer appeared on the cornea, and a red mass began to bulge through the opening, which no amount of escharotics seemed to lessen; so I decided to operate, and asked Mr. Elphick to assist me. I may state that

this cow was suffering from Tubercle, and it was my opinion the diseased condition of the eye was due to the same cause. On removal of the organ this proved to be correct. We did not enlarge the orbital opening, but placed a ligature round the eyeball and drew it forward, thus enabling us to place the chain of an ecraseur as far back as possible; then we gradually tightened the screw, and the eyeball dropped out of its socket, without any apparent suffering to the animal, while there was no hæmorrhage, none whatever. We then dipped a piece of cotton wool in carbolised oil, and placed it in the cavity; lastly, we tied a bandage over the part, and the operation was completed. The wound healed rapidly, until it was quite well. Now, sir, I shall be only too glad if some member will criticise our procedure, and point out to us where we were deficient, or erred. My only wish is to improve our manipulative surgery, and attempt at least to become experts in operations; for I am afraid we are greatly behind the medical profession in the science and art of surgery. In conclusion, sir, I trust it will not be long before Part II. of your text book of operative veterinary surgery is issued to the profession; we greatly need it.—I am, yours respectfully, WM. HUNTER.

192, Westgate-road, Newcastle-on-Tyne.
December 22nd, 1886.

MEETINGS OF SOCIETIES.

The Annual Meeting of the Royal Counties Veterinary Medical Association will be held at the Great Western Hotel, Reading, on Friday, February 25th.

The Annual Meeting and Dinner of the Lancashire Veterinary Medical Association will be held at the Grand Hotel, Manchester, on February 18th—the Meeting at 4.30 p.m., and the Dinner at 6 p.m.

COMMUNICATIONS omitted from this month's JOURNAL will appear in our next.

Communications, Books, Journals, etc., Received.

COMMUNICATIONS have been received from Professor Walley, Edinburgh; J. A. Nunn, A.V.D., London; R. H. Ringe, A.V.D., Muttra, India; F. S. Billings, Nebraska; R. W. Burke, A.V.D., Cawnpore; G. H. R. Wilkins, Lambourne; J. Moore, Manchester; C. Gresty, Newcastle-on-Tyne; T. C. Toope, Knaresborough; W. Hunter, Newcastle-on-Tyne; J. W. Ingram, Manchester; J. Cammack, Kimberley, Cape of Good Hope; A. W. Hill, London; Messrs. Gresswell, Louth; A. Smith, Toronto; T. Greaves, Manchester; "Peter Ramus"; Fred. Smith, A.V.D., Aldershot; T. J. Symonds, A.V.D., Bangalore; J. Donald, Wigton; C. Hartley, Lincoln; J. B. Wolstenholme, Manchester; H. Kidd, Hungerford; J. Hunter, Skene.

BOOKS AND PAMPHLETS: *J. B. and A. Gresswell*, The Bovine Prescriber; *T. J. Symonds*, Indian Grasses; *MM. Bouchardat et Vignardon*, Nouveau Formulaire Vétérinaire; *H. Imlin*, Viehseuchen Bulletin von Elsass-Lothringen; *F. La Torre*, Il Metodo Antirabico Pasteur Modificato; *S. Rijks*, Veeartsenijschool ze Utrecht—Programma der Lessen voor het Schooljaar, 1886-87.

JOURNALS, ETC.: *Clinica Veterinaria; Annales de Médecine Vétérinaire; Recueil de Médecine Vétérinaire; Revue Vétérinaire; Archiv für Wissenschaftliche und Praktische Thierheilkunde; Wochenschrift für Thierheilkunde und Viehzucht; Lancet; American Veterinary Review; British Medical Journal; Mark Lane Express; Live Stock Journal; Journal de Médecine Vétérinaire; Edinburgh Medical Journal; American Live Stock Journal; Nature; Thierarzt; Hufschmied; Écho Vétérinaire; Practitioner; Journal of National Agricultural Society of Victoria.*

NEWSPAPERS: *Pall Mall Gazette; Scotsman (five copies); Edinburgh Evening Dispatch; Edinburgh Evening News; Preston Herald; Eastern Counties Gazette.*